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EEI BULLETIN

• APRIL 1959 •

EEI Convention Issue

PUBLISHED BY EDISON ELECTRIC INSTITUTE

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

(Includes Investor-Owned Companies, Cooperatives, and Government-Owned Utilities)

December 1957-1958

SOURCE AND DISPOSAL OF ENERGY—MONTH OF DECEMBER

	1958	1957	%
NET GENERATION* (Kwhrs in Thousands)			
By Fuel Burning Plants	48,458,394	41,658,242	+16.3
By Water Power Plants	10,752,610	12,473,187	−13.8
Total Generation	**59,211,004**	**54,131,429**	**+ 9.4**
ADD—Net Imports Over International Boundaries	274,556	339,370	−19.1
Less—Company Use	177,011	157,842	+12.1
Less—Energy Used by Producer	1,700,157	1,530,853	+11.1
Net Energy for Distribution	**57,608,392**	**52,782,104**	**+ 9.1**
Lost and Unaccounted for	7,270,985	5,720,433	+27.1
Sales to Ultimate Customers	**50,337,407**	**47,061,671**	**+ 7.0**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of December 31st			
Residential or Domestic	47,788,587	46,857,066	+ 2.0
Rural (Distinct Rural Rates)	1,634,348	1,635,227	− 0.1
Commercial or Industrial:			
Small Light and Power	6,281,076	6,186,701	+ 1.5
Large Light and Power	315,410	308,751	+ 2.2
Other Customers	189,070	183,344	+ 3.1
Total Ultimate Customers	**56,208,491**	**55,171,089**	**+ 1.9**
KILOWATTHOUR SALES—During Month of December (Kwhrs in Thousands)			
Residential or Domestic	14,419,531	13,553,049	+ 6.4
Rural (Distinct Rural Rates)	791,146	729,803	+ 8.4
Commercial or Industrial:			
Small Light and Power	8,564,322	7,931,565	+ 8.0
Large Light and Power	24,449,090	22,910,716	+ 6.7
Street and Highway Lighting	559,617	516,425	+ 8.4
Other Public Authorities	1,126,503	1,011,998	+11.3
Railways and Railroads:			
Street and Interurban Railways	208,961	198,223	+ 5.4
Electrified Railroads	162,653	163,394	− 0.5
Interdepartmental	55,584	46,498	+19.5
Total to Ultimate Customers	**50,337,407**	**47,061,671**	**+ 7.0**
Revenue from Ultimate Customers (Thousands)	**$848,962**	**$798,014**	**+ 6.4**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—for 12 months ended December 31, 1958			
Kilowatthours per Customer	3,366	3,174	+ 6.0
Average Annual Bill	$85.16	$81.25	+ 4.8
Revenue per Kilowatthour	2.53¢	2.56¢	− 1.2

* By Courtesy of the Federal Power Commission.

THE EDISON ELECTRIC INSTITUTE BULLETIN is published monthly, except bi-monthly in July and August, by the Edison Electric Institute, an association of electric light and power companies in the United States and its territorial possessions. Its affiliate members consist of private electric utilities in North, Central and South America and contiguous islands in the Western Hemisphere.

The objectives of the Edison Electric Institute are:

The advancement in the public service of the art of producing, transmitting, and distributing electricity and the promotion of scientific research in such field.

The ascertainment and making available to the members and the public of factual information, data, and statistics relating to the electric industry.

To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

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Closing date for the BULLETIN is the tenth of the month preceding the month of issue.

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The Edison Electric Institute does not assume responsibility for, nor necessarily endorse or approve, statements made by contributors to the BULLETIN.

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ON THE COVER: The Edison Award, the highest honor of the electric industry, was presented for the first time this year. It replaces the Charles A. Coffin Award. The sculptor's model for the face was executed by Albert Philip d'Andrea, New York.

EEI BULLETIN

April, 1959

Vol. 27 No. 4

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ALLEN S. KING

Newly Elected President of the Edison Electric Institute

Steady Electric Industry Growth Seen Increasing U.S. Power Lead Over Russia

More than 2,300 Attend EEI Convention in New Orleans; 'Electric Power for a Strong America' Is Theme

ELECTRIC industry expansion plans for the next 10 years will not only continue to make available an abundant supply of electric power to help keep America strong, but will substantially increase the United States' present superiority over Russia in the vital field of electric power, Institute President J. E. Corette emphasized in keynoting the 27th Annual EEI Convention in New Orleans, April 6-8.

The Industry's Future

President Corette predicted in the Convention's opening address that by 1968, the electric utility industry will have about doubled its generating capability and annual production of power. He said more than 1.3 trillion kilowatt-hours will be produced in 1968, while gross plant of the electric companies should more than double, reaching $86 billion.

In discussing United States power supply compared with that of Russia, Mr. Corette told newsmen in a Convention-eve press conference that he could say "categorically that the United States is far ahead in electricity supply, and that there is no evidence that the Russians will catch up in the foreseeable future."

On the basis of latest comparable figures, the United States leads Russia by 98 million kw of generating capacity, Mr. Corette stated. By 1965, "our lead will have increased to 142 million kw." In per capita production of electricity, Russia is about 20 years behind the United States, he pointed out.

More than 2,300 electric company executives and guests attending the Convention heard speakers outstanding in their fields discuss a wide range of prospects and challenges bearing on the Convention theme. Among the subjects treated were atomic power, system design for the future, financing requirements, pricing policies, sales programs, important aspects of the Russian problem, government competition, inflation, and the need for greater public understanding of the American economic system in general and the electric power industry in particular.

The Convention was one of the most stimulating and informative EEI annual meetings ever held, with the speakers offering realistic appraisals of the future, and outlining useful courses of action to be taken in achieving goals important to the nation, to the industry, and to individual companies.

It was emphasized that despite the excellent record of the investor-owned electric companies in supplying power needs and despite their demonstrated ability to continue to meet U. S. power requirements, the industry is faced with aggressive, serious competition from Federally owned and financed power.

"To stop the trends of the past 25 years, which lead to ultimate socialism, to ultimate loss of our freedoms, our wonderful productivity and our standard of living," Mr. Corette proposed a seven-point program, including: continuance of the best possible service to electric customers; employment in the electric industry of the most capable people available in every field of endeavor; a step-up in the activities of industry advertising and public relations programs; development of a major economic education program; increased and active interest in politics at all levels; encouragement of interest and support from other citizens; and aggressive and courageous opposition to "government ownership in every field of business and unnecessary government controls and activities."

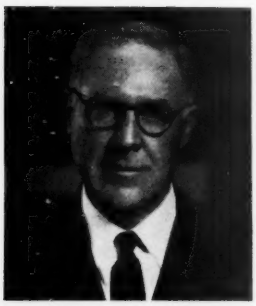
Allen S. King Elected President

Allen S. King, President of Northern States Power Co., Minneapolis, Minn., was elected President of the Institute, to take office on June 1. He will succeed Mr. Corette, President of The Montana Power Co., Butte, Mont.

Mr. King was presented to the Convention at the last session on Wednesday afternoon. In his remarks, Mr. King said he expects, during his term, to emphasize the local nature of the utility business.

Each of our companies operates in some specific area of the country, he said. "We solve all of our operating problems on a local basis. We are really operating right down on 'Main Street.' That is our great strength."

New Members of the EEI Board of Directors



E. R. ACKER
President, Central Hudson Gas & Electric Corp.

W. L. CISLER
President, The Detroit Edison Co.

J. E. CORETTE
President, The Montana Power Co.

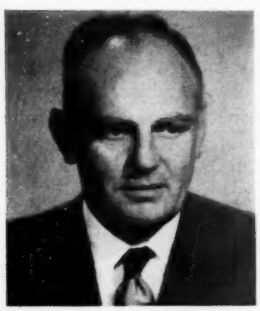
G. W. EVANS
President, Kansas Gas and Electric Co.

O. T. FITZWATER
President, Indianapolis Power & Light Co.

R. A. GIBSON
President, The Hartford Electric Light Co.

R. E. GINNA
Chairman, Rochester Gas and Electric Corp.

E. L. LINDSETH
President, The Cleveland Electric Illuminating Co.



J. W. MCAFEE
President, Union Electric Co.

H. M. MILLER
Chairman & President, Columbus and Southern Ohio Electric Co.

E. M. NAUGHTON
President, Utah Power & Light Co.

J. L. RICE, JR.
President, The West Penn Electric Co.

H. P. TAYLOR
President, Wisconsin Public Service Corp.

O. TITUS
President, Metropolitan Edison Co.

D. J. TUEPKER
President, Public Service Co. of Oklahoma

New President of the Institute

ALLEN S. KING, President of Northern States Power Co., Minneapolis, Minn., has been elected President of the Edison Electric Institute by the Board of Directors, to take office June 1.

Vice President of the Institute since last June, Mr. King will succeed J. E. Corette, President and General Manager of The Montana Power Co., as head of the trade association of the nation's investor-owned electric companies.

Mr. King has been President of Northern States Power Co. since 1954. He began working for NSP as a meter repairman while still in high school, and continued to work for the company during summer vacations from Massachusetts Institute of Technology, where he graduated in 1922 with a degree in electrical engineering.

His first full-time assignment with NSP was as engineer on a steam main construction job in Fargo, N. D. This was followed by a year in the credit department of the company's Minneapolis office and by assignments in the testing laboratory and the Riverside steam generating station.

In 1945 he became Fargo division manager with general supervision of the company's activities in North Dakota.

He was elected executive vice president in 1951 and elected President of the company in January, 1954.

Mr. King has served on the Edison Electric Institute's Advisory Committee and its Atomic Power Committee, and was a member of its Board of Directors. He is also a member of the Board of Directors of the Northwest Bancorporation, the Northwestern National Bank, the Community Chest, the Minnesota Orchestral Association, and the Minneapolis Foundation. Mr. King is a member of the Association of Edison Illuminating Companies, and the Engineers Club of Minneapolis.

Under Mr. King's leadership, Northern States has pioneered in many fields, including atomic power.

Among the many interests of the EEI President-elect are atomic power, area development and youth activities.

He is Vice Chairman of Region 10, Boy Scouts of America, Secretary of the Minneapolis Club and Vice President of the United Hospital Fund. Mr. King is a member of the Governor's Committee of 100, which is devoted to area development activities, the Governor's Tax Study Committee, the Upper Midwest Research and Development Council; Executive Committee for the Eisenhower Presidential Library, Technical Panel for the Youth Conservation Committee, the U. S. Chamber of Commerce's Committee on Commercial Uses of Atomic Energy, the Minnesota Committee of the Invest-in-America Week.

Active in the Episcopal Church of Minneapolis, Mr. King is a member of the Elks Club, the American Legion, Minneapolis Athletic Club, Minikahda Club, Lafayette Club, Engineers' Club of Minnesota, MIT Alumni Club, Mid-Day Club of Chicago, and the Metropolitan and Harbor Clubs of New York.

Mr. King was married in 1924 to Miss Ann E. Quigley. They have one son, George S. King, pastor of St. Helen's Episcopal Church in Wadena, Minn.

Taking the place of the Charles A. Coffin Award, the new Institute Award is given annually to an electric company for distinguished contributions to the development of the electric light and power industry for the convenience of the public and the benefit of all.

The President-elect pointed out that the investor-owned electric industry is always attacked by its opponents in a general manner, and that an effective approach to the problem lies in each company telling its story in a clear, forthright way to its friends in its own operating territory.

Sherman R. Knapp Elected Vice President

Sherman R. Knapp, President of The Connecticut Light & Power Co., Berlin, Conn., was elected Vice President of the Institute, and Harold S. Sutton, Treasurer of Consolidated Edison Co. of New York, Inc., was re-elected EEI Treasurer. Fifteen member company executives were named to the Board of Directors for three-year terms. Edwin Vennard was re-elected Vice President and Managing Director of the Institute, and A. B. Morgan was re-elected EEI Secretary and Assistant Managing Director. Mr. Knapp will begin his term of office on June 1.

Alabama Power Co. received the newly established Edison Award. The company was cited for its "exceptional business statesmanship in conceiving a comprehensive program for the complete development, by use of private investor capital, of the water resources of the Coosa and Warrior River systems in Alabama." The Edison Award is the highest honor of the electric industry.

Remarks of Allen S. King in Accepting Presidency of the Edison Electric Institute

IT is a great honor, and also a great opportunity, for me to have the privilege of serving as President of the Edison Electric Institute for the coming year.

Although I have been in the electric power business all of my working life (having started with Northern States Power Co. working summers while still in high school) it has only been since becoming associated with the Board of Directors of EEI some seven years ago that I have realized to the fullest degree the inherent greatness of our industry.

My previous associations, which were largely in my own company or in our immediate territory, had prepared me to some extent for what I discovered in EEI, but one must experience the situation himself to know of the complete dedication of such outstanding men to the service of the public throughout this country.

The Board of Directors represents a good cross section of our industry, with each member representing a company doing business somewhere in the United States. From the Board one can judge the general character of our industry, and the spirit of dedication which motivates its leaders. I believe it is fair to say that there is no industry today that is operating on a higher ethical plane or with greater dedication to the service of the public.

Such being the case, one wonders why our industry is now subject to such virulent attacks, and why our attackers are apparently able to command any listeners. A really clear answer to this question could help us greatly in solving our present most serious problem. I have a partial answer that might be of real assistance to us.

It may be that we have been permitting a view of our industry quite separate and distinct from the corporate image we have created in our own communities. Our attackers talk in broad general terms, and on more or less of a national scale. They are careful not to define their terms, nor to stipulate just exactly whom they are attacking. They seem careful to avoid attacking a company or the corporate image our various companies have developed in their own territories. We hear such statements as the "predatory interests squeezing unjust profits out of the people," etc. Never do we hear an attack made honestly and straightforwardly upon a man—a group of men—or a company. The so-called "predatory interests" are never defined, nor are we told just who will get the unjust profits. The whole area of attack is kept vague and carefully avoids the corporate image that each of our companies has created in our own areas. This may give us a basis for action.

Each one of our companies operates in some specific area of the country. We solve all of our operating problems on a local basis. We are really operating right down on "Main Street." That is our great strength. In these great national issues we must remember that there is no simple way of getting our story over. We cannot buy the job done; advertising alone will not do it; no national organization can do more than coordinate and stimulate. The real job is ours right down on "Main Street."

If each one of our companies would realize that it alone can reach the people in its territory—that such an approach is the only effective way to reach people—and would then lay plans to work with its neighbors, friends, and customers, we could make a real impact upon the thinking people of the country. All it requires is that each company assume full responsibility in its own area.

This year, as I undertake to serve you as your EEI President, I expect to be continually emphasizing the local nature of our business; and I shall attempt to encourage our individual companies to do a real job of education in their own territories. It seems like a simple program, but to me it seems so vital to success. As a matter of fact it seems to me to be the *key to success* in this problem of educating our people in the position of the electric industry as an integral part of our free enterprise system.

Mr. Clyde Ellis has said that the electric utilities are *not* a part of our free enterprise system. Many strong advocates of free enterprise agree with him and place a "but" in front of the utilities when speaking of free enterprise. That attitude is a major challenge to us. We must demonstrate to the people that we are in a *business*, and that we are part and parcel of free enterprise.

Our companies are owned by hundreds of thousands of stockholders, half of whom are women. Our companies are managed by career men who are deeply dedicated to the task of serving electricity to our people on the most efficient and economical basis. Our employees have demonstrated an outstanding ability to operate in the public interest. What is that if it is not free enterprising American business?

Let us tell our story in a simple way to the friends we have in our own operating territories. Let us get back to "Main Street." If each one of our companies does that, we can effectively cover the whole country. This is a simple approach to a complicated problem, but it can be most effective.

Let us shed the mask of bigness and all that it implies to people, and let us carry on our business right down on "Main Street" as the friends and neighbors of our customers.

It is my fervent wish that during the coming year I may measure up in some small degree to the splendid tradition laid down by the past presidents who have preceded me. If I can do that, I shall consider my time well spent.

Again, I thank the EEI Board of Directors for extending to me this great opportunity for service to a really great industry.

Sherman R. Knapp Elected EEI Vice President

SHERMAN R. KNAPP, President of The Connecticut Light & Power Co., has been elected Vice President of the Edison Electric Institute, to take office June 1.

Mr. Knapp has been President and a Director of The Connecticut Light & Power Co. since 1952. He joined the company in 1928 upon graduation from Cornell University.

Executive VP in 1949

He served as an engineer in the Operating and Sales Departments until 1937, when he was made manager of the New Milford District. In 1941 he became assistant to the sales vice president and he was named assistant to the president in 1948. In 1949 Mr. Knapp was elected executive vice president.

He is a vice president and a director of Yankee Atomic Electric Co., which is owned by a group of 11 New England utilities joined together to construct the area's first atomic electric power plant.

Served as EEI Director

Mr. Knapp has been a member of the EEI Board of Directors and served on a number of Institute Committees, including the General Division Executive Committee. He has served as president of the New England Gas Association and the Electric Council of New England. He is presently a director of the National Association of Manufacturers and a member of the National Industrial Conference Board and the National Planning Association. Mr. Knapp also served as chairman of the Connecticut Flood Recovery Committee following the floods of 1955.

SHERMAN R. KNAPP

Director of Six Companies

He serves as a director of the Connecticut Bank and Trust Co., the Emhart Manufacturing Co., the Hartford Accident and Indemnity Co., the Hartford Fire Insurance Co., the Hartford Steam Boiler Inspection and Insurance Co., and Scovill Manufacturing Co.

At presentation ceremonies Wednesday evening, the Award was accepted by Thomas W. Martin, Chairman of the Board, who has been the chief executive officer of Alabama Power Co. for 40 years.

With a gracious nod to the distaff attendance, the Institute hosted a Ladies' Luncheon and fashion show on Tuesday in the Tulane Room of the Jung Hotel, followed by a sightseeing cruise on the Mississippi steamboat, *President*. In welcoming the ladies to the day's festivities, President Corette called for their support and assistance when he urged them to take an even greater interest in the problems facing the electric power industry.

Entertainment Courtesy of GE

On Wednesday evening, the New Orleans Municipal Auditorium echoed to the downbeat of jazz and the high notes of opera as the Dukes of Dixieland and an array of musical artists entertained delegates, ladies and guests, through the courtesy of General Electric Co. Ronald Reagan, the voice of General Electric, was master of ceremonies of a program which featured Jo Ann Miller, Bob Gibson and opera stars Dorothy Kirsten and Richard Tucker.

In closing the Convention, President Corette expressed appreciation to everyone who worked to make the Institute's 27th Annual Convention in New Orleans a "grand success."

Corette Pays Tribute

Mr. Corette paid tribute to the Convention Program Committee, consisting of C. J. Forsberg, President, Wisconsin Power and Light Co., who was Chairman, and G. S. Dinwiddie, President, New Orleans Public Service Inc.; N. Bernard Gussett, Chairman of the Board, Iowa Power and Light Co.; R. G. Rincliffe, President, Philadelphia Electric Co.; W. O. Turner, President, Louisiana Power and Light Co., and William Webster, President, New England Electric System.

He thanked the speakers and "our hosts, New Orleans Public Service Inc. and Louisiana Power & Light Co., to whom I say that Southern hospitality has gained even greater stature," and put in a congratulatory word for the weatherman for his fine example of "climate control."

Mr. Corette expressed gratitude to General Electric for the evening of entertainment, to Westinghouse for the slide presentations made during the sessions, to the manufacturers and others interested in the advancement of the industry, and to *Electrical World* for its daily coverage.

Thomas W. Martin, right, Chairman of the Board of Alabama Power Co., is presented the new Edison Award by J. E. Corette, President of the Edison Electric Institute.

Alabama Power Wins Edison Award for Developing Water Resources

THE Alabama Power Co. received the electric industry's highest honor, the new Edison Award, for "exceptional business statesmanship" in developing the water resources of the Coosa and Warrior River systems.

The Award was presented to Thomas W. Martin, Chairman of the Board of Alabama Power Co., by J. E. Corette, President of the Edison Electric Institute, at the close of the Institute's 27th Annual Convention. The Edison Award was given for the first time this year, replacing the Charles A. Coffin Award which had been presented annually at previous EEI conventions.

Alabama Power Co. was cited by the judges "for exceptional business statesmanship in conceiving a comprehensive program for the complete development, by use of private investor capital, of the water resources of the Coosa and Warrior River systems in Alabama, for its effective public information program regarding this project, for obtaining necessary Congressional legislation and the approval of Federal bodies required to carry it out, thereby providing the State of Alabama with valuable power, navigation and recreational facilities, together with flood control and conservation of the water resources of the State, all accomplished without major controversy and all contributing importantly

(*Continued on page* 192)

Electric Power for a Strong America

By J. E. Corette
President, Edison Electric Institute

DURING the past year there have been many improvements in the Edison Electric Institute. The entire committee organization has been reviewed and revised, with important beneficial results. The staff has been expanded, and there have been some replacements. In my judgment, the Institute is better organized than ever before in its history to do for this industry the job which you want it to do.

I would like to review the situation of our industry for the decade 1958-1968 to show its importance to the economy of America, to review our problems and our responsibilities and make some vitally important suggestions for the future.

We are living in a troubled world. Our freedoms, our beliefs, our institutions, are threatened by an alien philosophy which attacks us both from foreign lands and from within our own country.

To protect this nation from foreign armies and ideologies, we must have a strong and sound economy.

Our nation's resources for defense, our national productivity, every part of our complex economy, are dependent upon an abundant and never-failing supply of electric power.

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 6, 1959.

Government ownership of utilities has always been the first goal of the socialists and communists. Because of this, the future of the American system of government is dependent on the electric business continuing in the hands of investor-owned, taxpaying companies. This places upon everyone in our industry a double burden both as an employee and as a good citizen. Our problem is not only to save our industry, but to save the American system of government, with its great benefits to the people.

Electric Utilities During the 1958 Recession

No one could introduce a program entitled "Electric Power for a Strong America" without first reviewing the stability and growth of the investor-owned electric power industry in the United States during the 1957-58 recession and its remarkable contribution to the economy of America during that difficult period. Let us compare the performance of our industry with all American industry in 1958.

Production: Although the index of industrial production in 1958 averaged 6.3 percent below the 1957 level, generation of electricity increased 2 percent. (Figure 1.)

Profits: When it came to profits after taxes, the in-

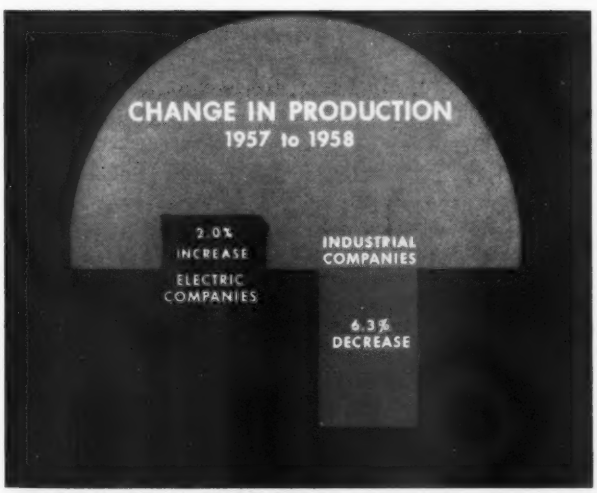


Figure 1

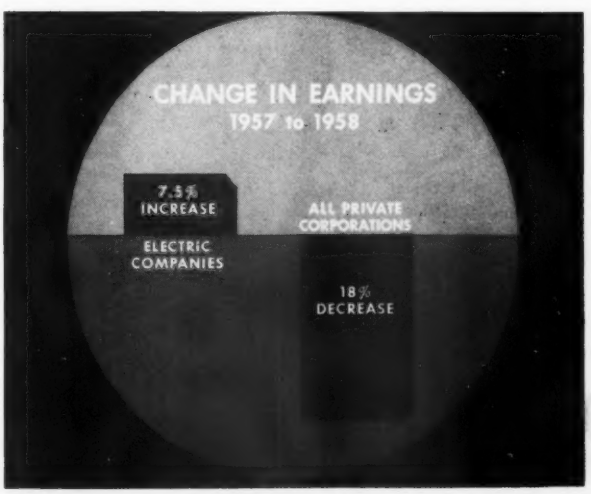


Figure 2

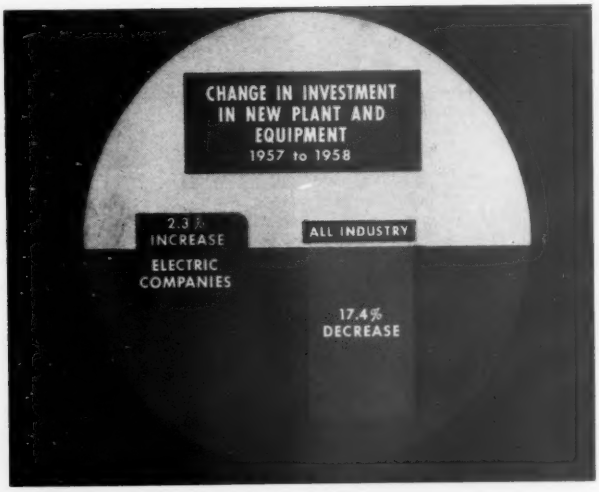


Figure 3

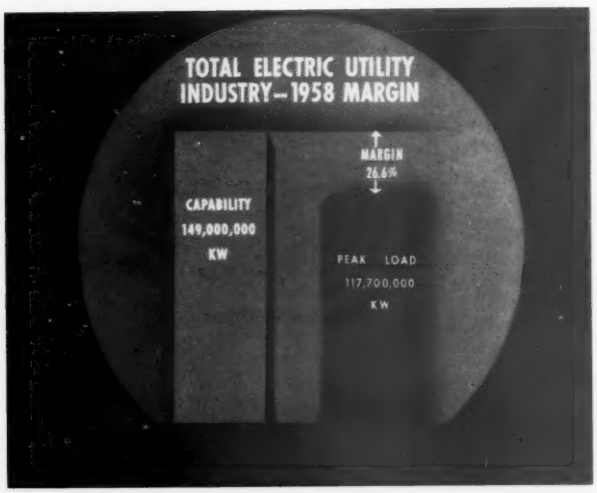


Figure 4

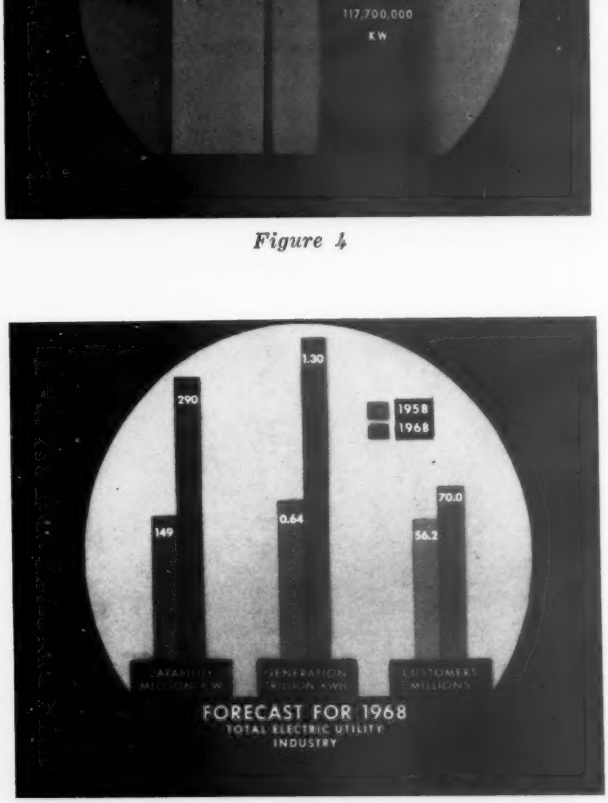


Figure 5

vestor-owned utilities showed a healthy 7.5 percent increase, while those of all private corporations decreased 18 percent. (Figure 2.)

Investment in New Facilities: During 1958, investor-owned utilities actually increased their construction expenditures 2.3 percent over those of 1957. This is in sharp contrast to the 17.4 percent reduction for American industry as a whole. The $3.8 billion spent by our industry on new plant and equipment in 1958 was $100 million over 1957 expenditures, was an all-time high, and represented one-eighth or 12.5 percent of 1958 expenditures for new facilities by all American industry. Facts such as these are important to all the people of America for they demonstrate the stability and strength of the investor-owned utilities during a period of stress. (Figure 3.)

Capacity Added: The power potential of the industry was sharply increased in 1958 by the addition of 14,100,000 kilowatts of new capacity. This exceeded the previous all-time high in 1955. Of this total, the investor-owned utilities were responsible for 82 percent.

Total Capability of Utility Facilities: The capability of the total electric utility facilities of the nation, both governmentally owned and investor-owned, at the end of 1958 was 149,000,000 kw. The 1958 peak was 117,700,000 kw. (Figure 4.)

We had a margin of 26.6 percent over the peak of 1958. The importance of this margin to national defense is very great indeed. America today is in a strong position in respect to electric power.

Wages and Salaries: In all industry in 1958, wages and salaries fell off about one-half of 1 percent while in our industry they rose 4½ percent.

1959 Looks Good: The industry will do better in 1959 than it did in 1958. We estimate that a total of 14,400,000 kw of new capacity will be added. This will exceed the 1958 all-time high by about 300,000 kw.

During the year, the industry should also add a million customers—just about what it did in 1958.

Average annual residential use should exceed 3,500 kw.

Generation should be about 695 billion kwhr, another all-time high.

1958-68 Decade

In our industry it is not enough to look only at what may happen next year. We have made a 10-year forecast based on projecting past experiences, on knowledge of present-day facts, on some knowledge of future requirements, and on seasoned and experienced judgment. These predictions reflect two basic assumptions:

- That there will be no major war.
- That there will be a continuation of the free enterprise system as we know it today.

Capability, Generation, Customers: Some of the results of this forecast are as follows: generating capability is expected to nearly double by increasing from 149,000,000 kw to 290,000,000 kw; the capacity that will be added will be modern and efficient and will include a substantial amount of nuclear-fired stations. Generation should more than double by increasing from 0.64 trillion kwhr to 1.3 trillion kwhr; customers will probably increase 25 percent, from 56.2 million to 70 million. (Figure 5.)

Figure 6

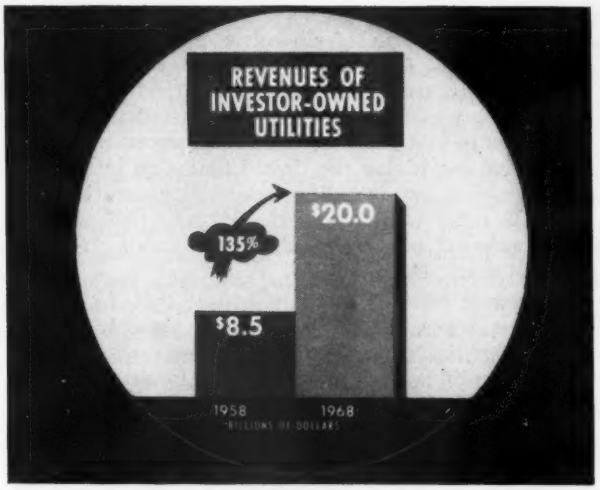


Figure 7

Gross Plant in 1968: Gross plant of investor-owned electric utilities will increase by 115 percent as a result of adding $46 billion of new investment to the 1958 investment of $40 billion. (Figure 6.)

Revenues in 1968: Electric company revenues should increase from $8.5 billion in 1958 to about $20 billion in 1968, representing a 135 percent increase over 1958 levels. (Figure 7.)

The program of expansion which I have outlined will make available an abundant supply of electric power to help keep America strong.

Size of the Job Ahead

The figures for the 1958-68 decade give an indication of the enormous job which our industry faces for the future to continue to supply electric power for a strong America.

Every department of every company in the electric industry will continue to have a monumental job if our industry is to carry out these predictions and is to do what is necessary to make available facilities and render the service necessary to keep pace with the growth of America.

We have done it in the past. We can do it in the future.

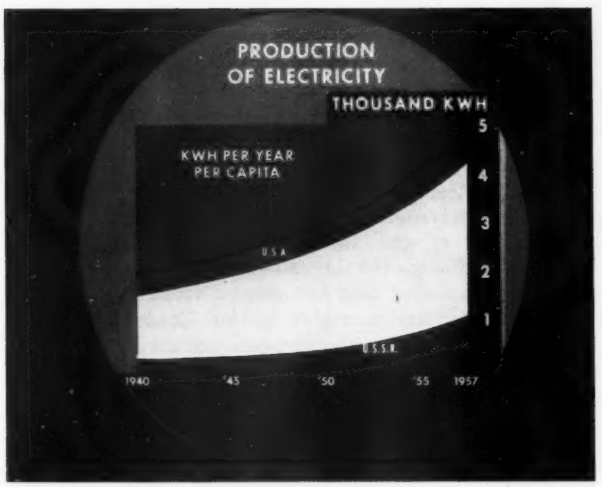


Figure 8

Comparison With Russia

Statements have been made that Russia's development of electricity exceeds that of the United States and, by inference, that the electric industry has been lagging. Let us look at some specific facts.

Per Capita Generation 1940-57: On a per capita basis the annual production of electricity in the United States in 1957 was about 4,166 kwhr, some four times Russia's per capita production of 1,044 kwhr. In fact, Russia's current per capita production is now at about the level of our per capita production in 1938. The United States has been continuously widening the gap ever since 1940. (Figure 8.)

Generating Capacity 1957-65: As of the end of 1957, Russia reported a total generating capacity of 48 million kw. At that time, the installed capacity in this country amounted to 146 million, or about 98 million kw more than Russia. (Figure 9.)

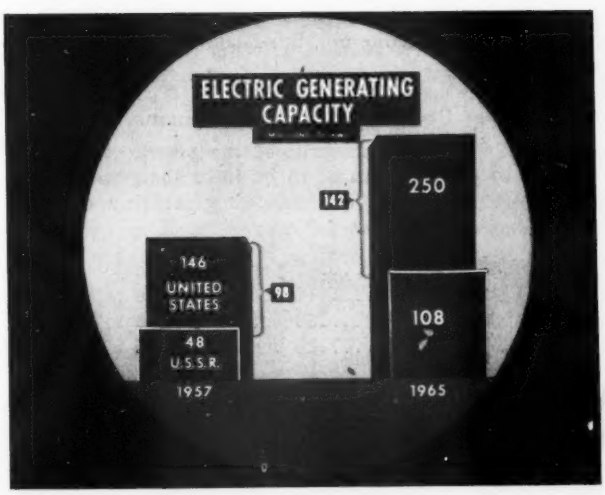


Figure 9

Recently the Russians have announced another of their long-term plans for electric power which have become famous for consistent failure to meet goals. The Russians are planning to add 60 million kw by 1965, which would give them a total installation of 108 million kw in that year. By that time, we expect to add 104 million kw, giving the United States an installation of 250 million kw, including industrial generating stations. In other words, between 1957 and 1965, we will have increased our superiority over Russia from 98 million kw to 142 million kw.

In view of these facts, it is evident that, in respect to electric power, the United States is not only holding its own but is increasing its superiority over Russia and will continue its world leadership in electric power supply.

Trends in America

To preserve those things which make America great, we must always be considering what is going on in this country, what the trends are and where they lead. Because, ordinarily, once you have lost a right or a privilege, it is too late to do anything about it.

Government in America today has what has been called political elephantiasis, as is clearly indicated in the following official statement made by the late Rowland Hughes, at that time Director of the Bureau of the Budget:

> "The Federal government is, among other things, the largest electric power producer in the country, the largest insurer, the largest lender and the largest holder of grazing land, the largest holder of timberland and the largest owner of grain, the largest shipowner and the largest truck fleet operator. For a Nation which is the Citadel and the World's principal exponent of private enterprise and individual initiative, this is an amazing list."

A recent Budget Bureau report found the Federal government engaging in approximately 20,000 commercial business enterprises, each of which could have been handled by an investor-owned business.

This trend is continuing as evidenced by such proposals as the so-called TVA revenue bond bill, the Columbia Valley Development Corporation bill, the Great Plains Administration bill of the last Congress, the socialized medicine bill, the Federal housing bill and many others.

Growth of Government-Owned or Financed Power

There is no better example of the growth and development of the government in business than the history of government-owned or financed generating capacity which has increased as follows:

1932..... 7 percent of the total
1940.....14 percent of the total
1950.....20 percent of the total
1957.....25 percent of the total

The Preference Clause

One reason for this amazing growth is the preference clause by which public agencies have a priority over all private utilities in the purchase of all of the power from every Federal project. This discrimination over private utilities exists even though the private utility is serving preference customers such as REAs, municipalities and military installations. This preference is an encouragement to the creation and development of government-owned, government-financed and tax-subsidized power systems.

The REAs

Let's consider for a moment the situation of the REAs. They were created to supply power to rural areas where service was not available from investor-owned companies. In order to do this, REAs were given subsidies in the form of 2 percent Federal money for all construction costs, no Federal or state income taxes, and state and local taxes at a small percentage of the taxes paid by investor-owned companies.

Over 97 percent of the farms in America are now being supplied with electricity and the REAs have expanded into the suburban, commercial and industrial business and into the generation and transmission business. In the past five years, the commercial and industrial business of all REAs has doubled. Now three out of every four new REA customers are non-farm.

Nationwide, the REA has completed its original job, has abandoned the concept of its creation and has become probably the most serious major competitor of investor-owned utilities. I strongly recommend that our industry make every possible effort to limit the activities of REAs to their original purpose.

Taxes of Government-Owned or Financed Projects

Tax avoidance in connection with electric power is of great magnitude. Government-owned or financed power projects represent about 29 percent of this nation's investment in electric facilities. But the users of the electric power produced by these projects contribute only 2½ percent of the total taxes paid by the customers of the electric industry. The users of the facilities of investor-owned electric companies, which constitute 71 percent of this nation's investment in electric facilities, pay 97½ percent of the taxes collected from electric properties and operations. (Figure 10.)

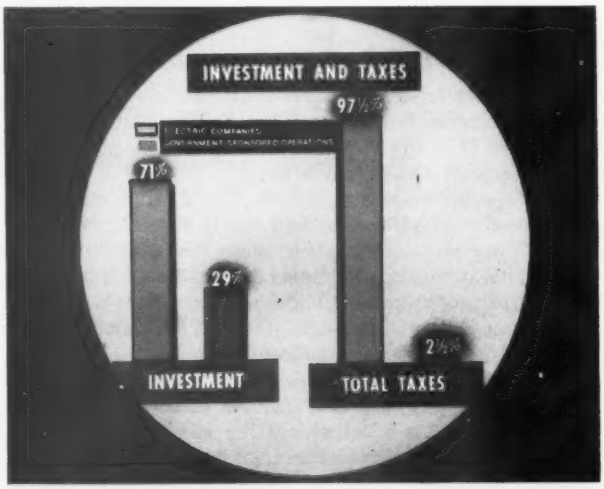


Figure 10

When related to revenues, investor-owned electric companies in America pay approximately 23 percent of their total revenues in taxes. On the other hand, government-owned or financed projects pay only 2.4 percent of their revenues in taxes. In other words, the rates of investor-owned electric companies are about 28 percent higher than they would be if those companies paid the same taxes as government-owned or financed projects.

Ultimately, such discrimination will drive private enterprise out of any field the government enters. By its very nature, government possesses immensely valuable special privileges such as freedom from taxes, access to the public purse and availability of low-cost capital. Thus, government has an overwhelming and unfair competitive advantage over its citizens in any field of commercial or industrial endeavor.

The ECAP Ad Situation

In my judgment, nothing in recent years is more serious than the effort of the Internal Revenue Service for tax purposes and the Federal Power Commission for rate purposes to eliminate certain advertising expenses from the classification of ordinary and necessary business expenses.

This all started by communications from Senator Kefauver and Clyde Ellis to those two agencies, which resulted in a tentative conclusion by the staffs of IRS and FPC that all of the ECAP ads in the IRS case and about 45 percent of those in the FPC case relate to a "political controversy" and are propaganda and therefore not deductible.

This is an outstanding example of what comes from centralized government. In plain language, these two Federal agencies, by administrative decree, are deciding what ads are necessary in a competitive field and what ads are appropriate business expenses. This decision has always been a prerogative of management.

No industry is faced with more aggressive, more vicious, more difficult competition than the utility industry in the competition which it has from Federally owned or financed power. Throughout the nation there are outstanding examples of companies which have lost customers and lost properties to government-owned or financed projects. Throughout the nation there are examples of the difficult competition for new customers and new service areas which exists between investor-owned companies and government-owned or financed projects.

For our industry not to be allowed to deduct as an operating expense for tax purposes and rate purposes advertising costs when the ads relate to our competition with government power would be a serious blow, not only to our business, but to all free advertising and free speech in America.

The Supreme Court has recently held in the Cammarano and Straus cases that advertising expenses made by liquor dealers to resist prohibition legislation were not proper income tax deductions, but the electric utility situation clearly is distinguishable because our questioned advertising did not seek to influence legislation and because quite different regulations are at issue.

Impressive evidence is being brought together in our behalf to show the impact of government power on our operations and to demonstrate that our advertising not only has been necessary but that it also has been in the best interests of our security holders, our customers and the areas we serve. We can at least be hopeful that the agencies concerned will finally determine that decisions which you make as managers of your properties should not be reversed at the instance of those who would silence the voice of this industry at the same time that they loudly propagandize government power with tax-free dollars.

The industry is fighting and will continue to fight both before the Federal Power Commission and the Internal Revenue Service to protect what it believes to be its right to carry on this type of aggressive and competitive advertising and to deduct the expense for both rate and tax purposes.

Fortunately, many state commissions and the press of America strongly support our industry in its position on this advertising matter.

A Program to Success

My year as president of EEI has caused me to spend more hours than ever before on the development of a program of what must be done if we are to stop the trends of the past 25 years, which lead to ultimate socialism, to ultimate loss of our freedoms, our wonderful productivity and our standard of living.

I have a program of seven major points to suggest to you. (Figure 11.) It is:

- *Service:* We must continue the remarkable job we are doing of building all of the facilities necessary to supply all present and prospective customers in our service areas. We must continue to give our customers the best possible service.
- *Personnel:* We must employ in our industry the most capable people in every field of endeavor. College surveys in both the scientific and business administration colleges show that our industry is not a popular employer, that students believe it does not offer the opportunities of other business. I am convinced that in a great majority of cases, these conclusions are false; that our industry is a good employer; that it

PROGRAM TO SUCCESS
1 - Continue excellent service
2 - Employ capable people
3 - Expand public information program
4 - Conduct economic education program
5 - Encourage individual political activity
6 - Interest others
7 - Oppose government ownership

Figure 11

offers fine opportunities in a field which is vitally important to the American economy.

Review Recommended

However, I strongly recommend that every company review its standing as an employer and in doing so that it have in mind that no industry has a greater need for the finest possible people in engineering, operations, accounting, law, sales, advertising, publicity, public relations and political relations. No industry is in any better position to pay whatever compensation is necessary to attract the best people. The old theory that because we are a regulated utility we can't pay as high salaries as other industries is and always was fallacious and without foundation. Highly competent employees increase productivity, reduce expenses, reduce the cost to the customer. In our industry where profits are strictly regulated, the customer is the one who benefits most from efficient management.

- *Public Information Program:* We must be far more aggressive, active and courageous in our advertising and public information programs. Surveys clearly show that people don't know about preference, tax discrimination, government in business, inflation and other problems; that when they are informed, they are reasonable and fair-minded and oppose these things.
- *Economic Education:* With other good citizens we must actively carry on a major economic education program so that all the American people will realize and will protect with their last ounce of devotion the American system of government and business, the productivity, the high wages, and all the benefits that result from it.
- *Political Interest:* We must, as individuals, join other good Americans in taking an active and aggressive interest in local, state and Federal politics and in the party of our choice.
- *Others Must Become Interested:* We must encourage all other good citizens to follow our example and adopt the same program.
- *Oppose Government Ownership:* We must aggressively and courageously oppose government ownership in every field of business and unnecessary government controls and activities.

This program is essential, not only for the future existence and success of our industry, but of all American industry. Our industry is not doing anywhere near enough to succeed on any one of these points. We are losing ground every year to a vocal, aggressive, dangerous minority whose ultimate goal is destruction of investor-owned business.

America today is the world's outstanding example of freedom and prosperity for all.

A Simple Choice

Our choice is simple. We can do as much as we are now doing and ultimately we will lose our great industry. If we do this, as surely as night follows day, the American people will lose their freedom and their prosperity. If I may paraphrase the words of President Eisenhower in a recent speech, I will say:

> "We will follow the ruinous route of free republics of the ages, the route of deficit financing, of inflation, of government ownership, of taxes ever rising until all initiative, self-reliant enterprise and prosperity are destroyed."

The other choice is to follow a program such as I have outlined and to preserve the freedom and prosperity which we now have and which makes America the shining example of the entire world.

Condensed Version of Gilbert Report Is Available

EEI has announced the publication of a 16-page digest of the recently published Gilbert Report. The title of the new booklet is "Summary of Economic Aspects of Single Complete Electric Service Compared with Dual Electric and Gas Service for Multiple Housing."

It summarizes, in non-technical terms, the information contained in the report compiled by Gilbert Associates, Inc. of New York, N. Y., and which is now available from the Commercial Division of the Institute.

Primarily, the digest spotlights the main facts to be considered in the selection of either all-electric service or combination electric and gas service for multiple housing of the type frequently used on military installations.

The booklet provides data and analysis standards to enable engineers, architects, builders and others to make economic comparisons of the two types of service.

In the Digest

Some of the extracts from the Gilbert Report contained in the new digest include a chart showing how the consumer price of gas has steadily risen since 1934 while the average consumer price of an electric kilowatt-hour has declined, and a listing of some of the main economic considerations other than straight comparison of rated factors, such as safety, comfort, convenience, etc.

The new booklet is available from the Commercial Division of Edison Electric Institute, 750 Third Avenue, New York 17, N. Y., at $1.00 per copy. Discount prices are offered on quantities of 100 copies or more.

Last year EEI requested that a study of the economic evaluation of alternative utility services be undertaken. Malcom G. Davis, Vice President of Gilbert Associates, was in charge of the study. The Gilbert Report contains no "pat" answers to the question of which is most economic, full electric service or one of several combinations of gas and electric services to meet specific requirements. It does, however, offer a way to analyze each housing project on its own merits. The complete Gilbert Report also is available for $3 to member companies.

Are Women Important in Your Life?

By Mrs. Mary G. Roebling
Chairman of the Board and President, Trenton Trust Co.

I FEEL that the surveys of the electric industry that have been made by the Opinion Research Corp. require the considered activity of both men and women to reappraise the situation and do something about informing the public of the excellent work of private ownership of our utilities and push back the sponsors of a movement to increase Federal government participation in your business.

A Masculine Industry

Light and power is essentially a masculine industry run by men, on the pole lines or in transformer stations, from the board of directors down to the men in the boiler room. Women are in the minority positions, as clerks, bookkeepers or cashiers—but, as your chairman pointed out, women are important to the industry for many reasons that he knows about, but did not mention. For instance, women own more stock in the electric light and power industry than men do. These figures are available. Women are your most important customers, and because recent elections indicate that more women than men vote, they elect the administrations that regulate the industry, so maybe it is a good time for the industry to start cultivating women—other than to sell them merchandise. At least make them aware of not only your interest, but their own in what is going on in the light and power business.

Appeal to Women

I do not mean to be a Cassandra and predict dire things that will happen if women are not cultivated, but I would like to point out some places where the industry is missing some important help in not appealing to women as well as they might.

Of course, I had heard about the TVA but until I began research work for this article I never knew that about 60 percent of the women approved of the TVA. Neither did I know that generally speaking only 30 percent of those interviewed had ever heard of it. To many it meant nothing and no one apparently attempted to explain it.

I would think that an industry with so much of its future directly related to what happens to it through the expansion of TVA might well be interested in getting closer at least to those women who might be called "opinion leaders" to make sure that they know and understand about TVA, and about the bills that are before Congress. A very small percentage of the people of America even know there is such a thing as the TVA Revenue Bond Bill, and yet it is vitally important to you.

I come from the great State of New Jersey which might be regarded as a power man's paradise. The giant Public Service Co., the energetic and powerful Atlantic City Electric Co., the Jersey Central Power & Light Co.-New Jersey Power & Light Co., Rockland Electric Co. and Orange & Rockland Electric Co., are all excellently managed with reasonable rates.

As far as I know, less than 1 percent of our government tax money is included in New Jersey utilities construction. We are a proud people and our great light and power companies reflect that pride in private ownership.

Free Enterprise and New Jersey

When I refer to our state pride, it comes naturally from the free enterprise system that has done so much to make New Jersey famous. Its heritage springs from its position in the Delaware Valley and its historical place as a birthplace of the nation. In the Valley, Cape May, Gloucester and Salem Counties, New Jersey boasts some of the earliest settlements in the New World. An escape from the regimentation of the Old World brought those settlers to America.

New Jersey Is an Ideal

So New Jersey to me is an ideal with the free enterprise system in full sway, born of a hardy race of men and women who resented any invasion of their American way of life from anyone, be it an English king, whose avarice clouded his discretion, or a Federal government which might elect to impose its philosophies of public ownership upon its people. We in New Jersey, are happy with our public service companies. They are free and untrammelled stock companies who owe no allegiance to Federal politicians. They represent close to 150,000 stockholders.

New Jersey can boast of its great citizen, Thomas A. Edison, whose contribution to the light and power in-

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 6, 1959

dustry advanced our civilization at a tremendous pace.

It was in New Jersey that the inventive genius of Edison worked so painstakingly on the electric lamp. After some seven or eight thousand tries of different materials, and in a final burst of intense intellectual concentration running uninterruptedly for nearly two days, the siege against one of nature's secrets was victorious and the carbon filament emerged. Out of this sprang the great power and light industry of America. Let us not lose sight of the fact that the father of the great electric utility industry was a dedicated individual, not a bureaucrat—and it was he who said genius is 98 percent sweat—2 percent talent.

The Industry in Review

In reviewing the achievements of this magnificent industry, one and all must be impressed with its enormous talent, its great drive, and what it has meant in lifting the economy of the United States from manpower and animal power to push-button power. It has been the very basis for the dynamism of our country, for its continuing industrial triumphs, and for the highest standard of living the world has ever known. The process continues and we can look forward to a doubling of electrical energy over the next 10 years, which compares favorably with prospects of all the other economies of the world.

In all this, an informed public is our best friend.

I am the president of a bank, and as such, I suppose I am an opinion leader in my community. I have worked closely with the Public Service Co. that serves me, but mostly to the end of getting new business in New Jersey. This is all, within my recollection, that they ever tried to get me to do. They never asked me to act as a broadcasting station on "why women should be interested in who owns the light and power company that serves them."

My interests in life are many and they touch all sections of human endeavor.

The Family's Future

First and foremost, I am the head of a family and anything that affects its future receives my attention. These children and grandchildren have had the protection and privileges that have been given by a nation that has grown great as a result of the unfettered functioning of a system of free enterprise and it is my purpose to see that nothing shall mortgage their future.

I am not only the head of a family whose future I shall protect, but as an investor I have sizeable funds in a banking institution, whose investment portfolio and whose trust department security holdings contain private power and light company stocks and bonds. And to those who have questioned me regarding investments in the power companies' securities, in all good faith, I have given approval, when the company and its earnings merited such judgement. What is true of my favored picture of the private power companies is undoubtedly true of millions of other households throughout the nation, and we are interested in anything that affects the private power industry. Now let us take a long look at the possibilities of women becoming a part of this activity that is troubling the power and light people.

There are approximately 55 million women in the nation aged 21 and over—several million more women than men, and while I do not have available the ratio of women stockholders to men in the power business, the few reports I have show a study of stockholders in companies listed on the New York Stock Exchange and indicate 51.6 percent were women and 48.4 percent men.

Are women important in your life? The answer is yes.

1. They are your customers.

2. They use the appliances that boost the meter readings.

3. They own securities in your business and are increasingly in evidence in your stockholder meetings.

4. They are voters who can affect the issues that come before the city, state and nation.

5. There are many women in public office including the Congress before whom comes this special problem of TVA expansion.

6. They are the mothers of the generation which will suffer if the enemies of free enterprise prevail. So there is no question but that the women of America are important in your continuation as an exponent of that system.

There are three observations concerning some aspects of your situation:

- Public relations and woman power.
- Tax fairness and how to interest women in it.
- The necessity for big business getting into politics.

Two-Fold Target

As to public relations and woman power, it seems to me that in your public relations efforts you have had a two-fold target. The one to stimulate the increased consumption of electricity in the home, as well as by industry, and the other to define and emphasize the merits of private enterprise in the electric utility industry as against government ownership and extension such as TVA and proposed legislation looking to its extension.

In your appeal to the household the emphasis has been to the woman in her capacity as a housekeeper or a cook. You have tackled the great area of appliances as labor-saving devices and have encouraged the woman in the home to purchase the obvious improvements, and find relief from drudgery. Perhaps, you have not considered that in relieving her from drudgery you have put extra time in her hands, and you have not thought through what she *has been* doing and *can be* doing with this extra time.

In your public relations, where the slogans are good and the advertising is keen, your counsels, highly paid and efficient, have worked closely with the important executives of each company and there has been the full panoply of zeal and effort. You print serene advertising admonitions as to the merits of private ownership and the dubiousness of government-owned utilities and you emphasize the greater efficiency of private managements as against bureaucratic organizations.

I am not saying that the job has not been well done, but I wonder whether it has been done well enough, because the issue of government power against private power after all the tons of ink that have been spilled is still with us. I would respectfully suggest that you take as your target the woman in the home and see what you can do with her in allying her and her views on

your side, and I believe that this is the right side since, as a capitalist and a private enterpriser, I hold that the government should occupy itself with the issues which are most important if we are to survive in this challenging world. It is enough for our bureaucracies, and I do not use this word disparagingly, to think and plan and act on all of the multitudinous fields of international affairs, defense, long-range atomic planning, stimulation to basic research, education, and health without expanding in an area where private achievement has demonstrated such great efficiency. And we will skip over such omissions on your part as handling rural electrification so timidly that tax exempt government-sponsored institutions have sprung up in many areas of the country.

More Than a Cook

In your public relations program you should recognize the woman as more than a cook. You should realize that she is one of the principal owners of your securities, and, indeed, she is one of the principal owners of all the stocks and bonds of private industries in the United States. She also constitutes one-third of the 65 million employed in the United States and she has become important in many activities more or less closed to her a generation ago. In local affairs she has perhaps more influence than you recognize. In business affairs she has graduated out of the clerical ranks and has become an executive in her own right in many industries. It is no accident that I am president of a bank. It is a historic, *evolutionary*, or should I say revolutionary, consequence of the age in which we are living. Hence I should judge that you should direct more of your public relations appeal to the woman in your efforts to contain the government sector of the public utility business. You should use women in this appeal and in executive capacities, side by side with your other executives.

Perhaps the nearest approach to a woman's interest in her local light and power company is that of the mother or the potential mother among your employees; as a citizen of a nation that has grown great due to its adherence to the free enterprise system. Thus she prefers her children to grow into the atmosphere of freedom their forefathers died to perpetuate. As one author stated: "They gathered unto themselves their precious possessions of life and threw them with life itself into the fray." Such was the price paid for freedom in a growing America.

It is not impossible to reach the women and to make them your strongest allies. It has been demonstrated within the lifetime of everybody in this room that you can get us to send our sons and daughters to war to preserve freedom. Why then don't you do something about showing us how to preserve freedom when it is threatened right here and now through economic means.

I believe that an organization made up of the wives of executives and leaders in the private power business should form a movement to clarify the problems before this Convention—women who, by their very close association with the business, could be augmented by the women leaders of the nation in business and finance. A chosen group could each year be the guests of this association, and meet before the regular meeting.

This group of women could be marshalled together as powerful allies in this endeavor to solve the problems before the private power business.

As soon as the women of the nation are selected as to their willingness and capacity to be of service, the educational campaign should be put into effect.

May I suggest that a special report to women be worded so it could be understood by men and women alike. It would be a novelty, if nothing else, if it contained part of your problems; and please do not be afraid that it will encourage any movement toward placing more women on your boards of directors.

It would lead to a greater understanding by families, be they stockholders, employees or customers. You have such a great field there, and it should not be overlooked.

The Opinion Research Poll shows that you have done a magnificent job in furnishing women with good service, because 90 percent of the women polled answered that they know of no unsatisfactory electric service. So, you have a friendly group to talk to.

My second point was tax fairness and the woman. I need not tell you that in most households in the United States the purse strings are kept by the woman and it is she who has to tighten them if the budget threatens to be unbalanced. As a conservative creature, she is not familiar with the economic dexterity and the high finance of deficit financing and, in any event, there are scarcely any means at her disposal to float bonds, issue currency, or create deposits which are the prerogatives of the Federal government and the Commercial Banking System. She is loath to get into debt for running expenses but she can be made to understand the impact of taxes, whether municipal, state, or Federal; whether excise, property, or income tax. This is an area which I believe has been somewhat neglected.

Budget Balancing Difficulties

The Federal government is not the only governing body in the United States having its difficulties in balancing the budget. It has descended heavily upon many states and upon an increasing number of municipalities and communities.

The plight of the City of New York, the greatest metropolis in the world, is not unique. It is symptomatic.

The fact that Michigan has almost postponed some urgent current obligations, such as payrolls, is another example of the growing stringency of revenues vs. necessary expenditures which are increasing. There has been too much attention wasted bemoaning the size of our tax bill. It is $125 billion per annum, including the states and municipalities as well as the Federal government, and it is not going to decline. Instead of wasting our breath in trying to chop it down (and this does not mean that we should not try to economize), more energy (and I mean intellectual energy) should be devoted to bringing the problem to the full attention of the public —particularly to the attention of the woman in the home.

It should be pointed out to her that there are many segments of our society which escape taxation, and that while with one side of our mouths we talk of the necessity of increasing and finding taxable sources, with the other we sponsor and nurture many activities which

move into the tax exempt field, partly unwittingly. Obviously, to the extent that many activities of our society escape taxes, this means that the other activities must carry this tax exempt load as well as their own load.

Clearly there are many types of services which must and should remain free, but does this mean that when cities, states or the Federal government compete with private business they should do this on the unfair basis of a tax exempt status? As an example: if a university owns a macaroni factory, the macaroni factory should pay its full share of taxes on property and corporate income, even though the dividends therefrom should probably be tax exempt by the recipient. Thus, similarly, if the Federal government or the state or the counties elect to own and produce electricity these businesses should bear their full burden of property taxes, excise taxes, interest, and income taxes. I question the wisdom of having businesses, just because they happen to be government owned, be in a position to issue tax exempt bonds which, according to my frame of reference, constitute an additional factor of unfairness to the private business with which it purports to compete.

Attention: Women in the Home

This issue goes beyond private vs. government utilities. It extends to many sectors of our society, such as mutual savings banks, mutual insurance companies, and cooperatives. These matters should and can be brought to the attention of the woman in the home. The electric utility industry is in a strategic position to do this subtly but forcefully. The issue of tax equality, tax fairness, and everybody pulling his weight in the boat is a simple one and has meaning now that so many governmental bodies are struggling under the load of their responsibilities and their inability to find the means to fulfill them.

This brings me to my third and last point: the necessity of big business getting into politics at the grass roots level.

You who are assembled here are the smartest group of leaders in this country. You have not won your spurs easily, nor attained without merit your present high position that you hold in the industry. But you, for the most part, have concentrated on the highly important business of building and operating the greatest light and power business in the world. You have left the larger political issues to statesmen in whom you have faith, but you are menaced by a powerful group of ambitious individuals who would perpetrate light and power projects and authorities by government. To end this menace, you must enter the political arena and fight for your industry. Have you gentlemen polled the thinking of your employees on this subject?

The electric power industry has had some experience in political matters, at the local level or with state commissions or with the Federal agencies. More than most industries, its work has had to do with complicated legal and political relationships, with franchises and rates. It has waged political warfare to the extent that it deemed appropriate and it has been bolder, properly so, in its political activities than most industries and corporations. Our important businessmen interested themselves directly many years ago in the political affairs of the nation, but after Teddy Roosevelt and trust busting and muck raking, there was a drastic decline in what businessmen thought was a valid portion of their activities in the political sphere. For a period of time neither the capitalists nor the managers nor labor intervened heavily on the political scene. It was left to a vague band of politicians, do-gooders, intellectuals, writers, journalists, and lawyers to study, participate and act in the political arenas of the U. S.

More recently the great labor organizations have become powerful and have moved directly, or almost directly, into the political fray. Having large resources at their disposal and a great deal of manpower they have not been slow to influence elections and fight for or against issues.

This has brought about some restudy of the question on the part of corporations. Some of our important corporations have already elected to release their executives at all levels to enter political affairs and, in fact, to encourage them to do so. In some instances the corporations have taken a public stand and have spent money to side for or against a particular viewpoint. And there is the Texas Association of Corporate Legals For Political Action.

There are two ways in which you might have influence in bringing the corporate capitalist or private enterprise viewpoint to bear on our political affairs. First, in addition to doing it yourselves, you could encourage, to the extent possible, corporations with whom you do business to release their men for activity at the grass roots level in either party, to give this viewpoint greater voice in our local political clubs, as otherwise it will go by default. I am convinced that a great deal of the grass roots ideas which simmer under the surface and finally come through do so on account of ignorance and naivete, rather than because of malice and hatred. The corporations can no longer allow their executives and their personnel to remain aloof from the political scene. They must enter it, however uncomfortable or new this role may appear to them. Then, secondly, you should exploit more fully the theme of women in politics. With time- and effort-saving devices, she is using the extra time which you are placing at her disposal, and can use it more adequately in politics at the local and state level. Her influence at national levels is no longer meager either. If you can bring home to her the thesis of tax equality and of sharing the burden in supporting the many social services which the woman, perhaps more than the man, feels are a necessity, much can be done in bringing order into some of the confused areas of our society.

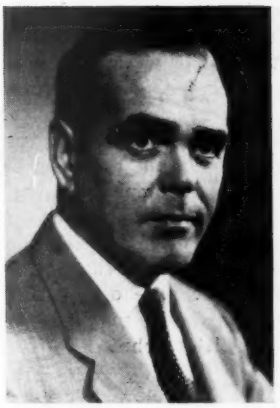
From the Local Level

This must start at the local level. It is fatuous to believe that a lobby in Washington can at the last moment stop a movement which may be the result of a ground swell which has originated at the local level. The place to educate, the place to explain, the place to preach private enterprise—and the virtues of our system—is at the home and the local level.

Whether you make use of woman power in your directorships is a matter for you to think about. It may be a good thing in those areas where the issue of government vs. private ownership of public utilities is frictional and difficult.

(*Continued on page* 184)

New Dimensions in the Electrical Future



By Mark W. Cresap, Jr.
President, Westinghouse Electric Corp.

In recalling past meetings of the Institute, while the titles of the speeches covered a wide range, the speeches themselves somehow ended up on one subject: the problems and opportunities of the electrical industry. I'm not going to break the pattern.

In my opinion, our problems have never been so serious—and our opportunities have never been so great.

Our greatest opportunity lies in national growth—in the coming expansion of our economy. That growth has been phenomenal in the past 10 years, but it can be even more phenomenal in the next 10 years. Projected figures indicate the increased production of new cars and appliances, the new houses and schools, the huge increase in the numbers of children who, in the decade ahead, will be reaching the age when they form families of their own. By 1969, our total production of goods and services should approach almost $700 billion—in terms of current prices. That is half again greater than our present national output.

Industry forecasters tell us that such a standard of living will require at least a 170 percent increase in the use of electricity for each hour of human effort consumed in manufacturing. Your residential customers, 10 years from now, will use an average of more than 6,850 kilowatt-hours per year as compared with 3,366 this past year. The commercial load will make similar strides.

1.5 Trillion Kwhr in 1969

We are told that, to serve this vast load, the electric utility industry will be required, in the year 1969, to generate 1.5 trillion kwhr—nearly 2½ times last year's production. This means that, given the most optimistic improvement in your load factor, you will still have to build an entirely new system the size of the one you are now operating.

Such a bright future will not fall into our laps. The future has got to be earned, and there will be plenty of roadblocks along the way.

On the surface it might appear that our biggest problem will be technological development. But we have evidence that this won't be true. In the past 20 years, our technology has advanced further than it had in the previous 100 years.

In our industry, we are prepared to do things that were unbelievable just 10 years ago. If the demand should warrant it, we are capable of building generating units approaching one million kilowatts of capacity. Ten years ago, 150,000 kw was considered quite an accomplishment. Today, 500,000 kw is not.

We are also prepared, through advances in transmission and distribution apparatus, to deliver this power over greater distances. And we are prepared to do it more economically, more reliably, and more automatically than ever before.

Technology will not be our major problem—as long as we support the research and development that make technological advance possible.

Inflation Is Big Problem

There is one big problem that could darken the outlook for our future. That big problem is *inflation*, and its inevitable consequences.

The cure for the inflation in our economy may be complex, but the cause of it is quite clear. We have been distributing the fruits of our production faster than we have been earning them. We have been raising wages faster than we have been raising productive efficiency. Employers have simply had to pay their higher costs, if they can, out of higher prices. There's not much else they can do in that situation—not if they want to stay in business.

In the case of my own company, as well as others in the industry, the result of wage increases that have not been matched by productivity increases has meant a serious cut in our profit margins in order to keep the price of our products attractive to customers and keep as many employees on the job as possible.

The effects of this inflationary spiral must be obvious to anyone with eyes to see and a heart to feel. When prices are pushed higher than consumers are willing to pay, the inevitable result is economic dislocation followed by unemployment. When wage rates are lifted by the pressure of national unions to what only the most efficient companies can pay, then the less efficient companies suffer—and so do the people who work for those companies. Each of you has seen examples of this among your own commercial and industrial customers—of com-

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An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 6, 1959.

panies that went under because they could not afford the capital cost of more labor-saving machinery, but that still had to match the highest industry wage level, and so could not maintain competitive rates in its industry.

For the past 20 years, both utility and manufacturer have been faced with rising costs and with all the problems that come charging along with rising costs.

My own company's labor costs have more than tripled since 1939. Despite that increase, we have been able to hold the price increases on our total line of products to a little more than half as much as our increase in costs. We have done that through improved productivity, expanding markets, better management techniques, and better technolgy.

Price Line Held

In electrical equipment and apparatus, we have been most successful in holding the price line on those products which contain the greatest amount of mechanization. It becomes increasingly difficult to do so as the labor content of the finished product increases.

Turbine-generators, power transformers, switchgear, power circuit breakers, for instance, do not lend themselves to assembly line production. They require thousands of hours of design and production time, most of them requiring high skills. Moreover, as the machine becomes more complex, more sophisticated, it requires ever-increasing amounts of labor per unit, just as today's military bomber or submarine requires more labor. To engineer a control system for a machine tool, for instance, takes eight times as many engineering hours today as it took 10 or 12 years ago.

But even in spite of this, prices of the "so-called" heavy apparatus have risen considerably less than have the other items you buy in expanding your systems. Your own capital budget accounts show that you are spending 72 cents of each investment dollar for products other than electrical apparatus—for such items as land, buildings, right-of-way, towers, wire, and cable. Similarly, the Handy Whitman Index shows that the increase in price of these products since 1939 is exactly 47 percent more than the increase of heavy electrical apparatus and equipment.

Also, the point must be made again—since it is sometimes forgotten—that today's machines are far more efficient than their prototypes of 20, 10, or even five years ago. The technique of inner cooling, for example, introduced into turbine-generators in 1954, has made it possible to obtain almost twice the electrical output from a machine of given physical size. You are paying $68 more today for a 25-kva distribution transformer than in 1939—a 27 percent increase in price. But that is first cost only. Design improvements since 1939 offer savings of $137 for each transformer.

Inflation has also been a pressing problem in the utility industry. Nevertheless, through hard work, good management, and improved facilities, you have done an outstanding job in keeping your costs and your prices under control. Since the war, based on our calculations, productivity in the utility industry has increased at a rate far greater than for the private economy as a whole.

In my opinion, our economy stands now at a very delicately balanced point in history. We have managed, by good sense and steady nerves, to come almost intact through a year-long recession. With good sense and steady nerves, we can continue our national growth, master the unemployment that hangs over us like a cloud, and pay for the military protection we need. But now, as we catch our breath and prepare for what lies ahead, we have a crucially important decision to make.

On the one hand, we can continue the same wage-price spiral policy we have followed since the war. Industry can continue to grant unearned wage increases, as it did even throughout the 1958 recession, and then try to recover its costs by raising its prices still higher.

Or, on the other hand, industry can hold the line on wages and prices. More precisely, this means limiting the trend of annual wage increases to the trend of productivity increases. As a people, we can begin to pay ourselves what we earn, and still earn more—all of us—by producing more.

Which is it to be? The same issues are being examined in a great national debate and will be settled in the next few months.

Still further inflation induced by unearned wage increases will mean serious dislocation throughout the entire economy. The military services will be able to buy fewer armaments with their dollars, and so we will lose a margin of security and protection. Unemployment will increase, as it always has and always will under a market economy in which employers are forced to pay for work at rates higher than consumers are willing to restore to them in buying their products. State and city governments will be brought closer to the edge of bankruptcy—some are very close already—as their tax revenues buy fewer goods and services. Management of the public debt will become a nightmare. The taxing bodies will be forced to seek out new sources of revenue and place still heavier taxes on everyone, at a time when direct and hidden taxes are already taking about one-third of the average man's income. When tax revenues fall short, as they always seem to do, the money will be raised by credit—that is, by still more inflation. And up still higher will go the servicing cost of the public debt, up still higher will go prices, and, in the end, still higher will go unemployment.

Powerful Forces Evident

Unfortunately, there are powerful forces driving us headlong into this very course. The national labor unions are demanding across-the-board wage and benefit raises, without regard to gains in productivity, and with no consideration as to whether the economy is able to support those raises.

Is there no such thing as labor pricing itself out of work?

During the past 10 years hourly compensation of manufacturing employees has risen significantly more than output per man-hour. In each of those 10 years, the percentage rise in the hourly compensation of workers has exceeded the percentage rise in the consumer price index.

Labor has already priced itself out of a large segment of the export market for heavy electrical equipment. There is, however, one agency in Washington, the Export-Import Bank, which has consistently followed the policy of making loans to foreign purchasers for United

States goods and services. If the Export-Import Bank activity should be discontinued or curtailed, a sizeable percentage of current exports of American generating apparatus would disappear, involving a considerable loss which would affect both labor and the industry.

The effect of American labor rates completely out of line with world rates is unfortunately being increasingly felt in the domestic market. Agencies of the Federal government have been prone for several years to purchase foreign-made electrical equipment, in a short-sighted, over-emphasis on initial cost, at the sacrifice of the financially far greater considerations of life, performance and service. Recently, this problem was compounded by the decision of the TVA to buy its first turbine-generator, and its largest, from a foreign manufacturer.

Productivity Increases Employment

We are hearing a good deal these days to the effect that productivity increases are causing unemployment. This might be a valid argument if the American consumer consumed at a fixed rate, but he doesn't. The fact is that improved productivity means lowered prices . . . lowered prices mean increased consumption . . . and increased consumption means increased employment. It is growth through productivity that has made eight million new jobs in the past 10 years and has put more than 63 million of our people at work at record-high wages. It is productivity that has enabled us to double the amount of goods we produce and consume every 25 years, and only productivity can enable us to continue to do that in the future. It is productivity that makes us equal with the vastly greater manpower of the nations that threaten us. When and if this nation ever acts to curb its productivity gains for any reason whatsoever, we are finished as a world power.

We are also hearing a good deal these days about industry being able to afford to pay wage increases in excess of productivity without raising prices, financing the added costs out of profits. Unfortunately, that is what has been going on—at least in the electrical equipment industry. In the five-year period, 1952-1957, the margins in our industry declined about one-third as a consequence of financing a cost-price squeeze out of profits.

The simple fact is that, in our economy, every man's income is another man's cost. Every increase in wage costs, unless and until matched by an increase in productive efficiency, is an increase in the cost of production. These costs must be recovered in increased prices.

If industry were to pay a wage increase each year 1 percent in excess of improvement in productivity, and without any price increase, the last dollar of corporate profits would disappear sometime around the early spring of 1970. And if that happened, the problems I have discussed would have completely disappeared, because we would be enveloped by an economical and political system in which such problems are not permitted to exist, and in which neither private business nor free labor unions are permitted to exist.

These problems we have—these problems of spiraling costs—of wage rates outrunning productivity gains—of wage increases costing us out of competition with foreign producers—these problems are larger than our industry. They are national problems, but our industry—the future of our industry—is intimately concerned with how our nation meets and solves them.

As a representative of the electrical industry, I suggest that we tackle the problem by dealing forcefully with the two basic factors of the inflationary equation: acceleration of the upward trend of productivity, and continued resistance to wage increases exceeding the rise in productivity.

What can we do to increase the rate of productivity increase?

First, we can assure that the tradition of our industry in this regard is maintained. The aggressive pursuit of this tradition, by the electric utilities and the electrical manufacturers, has provided the American economy a shining example of close customer-supplier cooperation making a striking contribution to an improved standard of living and to the fight against inflation. This long-term cooperation, aimed at constantly more efficient generation, transmission and distribution of electric power, is something of which we can feel justifiably proud.

I pledge Westinghouse to continued efforts, not only to maintain this tradition, but also to enhance it. As evidence of this pledge, in spite of the cost-price squeeze of recent years, and in spite of the temporary lull in our business with utilities, we are currently spending, for apparatus research and development, substantially more than we have in the company's history. Also, we will have invested during the five-year period, 1957 to 1962, more in facilities for utility equipment development and manufacture than in any other period in our history, to improve our technology and to make sure you can get deliveries when you need the equipment.

Joint Promotion

There is another effort we can make jointly as a contribution to accelerating the rate of productivity in this country. American industry is the mutual customer of both the producers of electric power and the producers of electric power equipment. We can make common cause in an intensified program to increase industrial productivity through powering up. We have a magnificent opportunity to promote jointly, even more intensively than we have to date, a higher rate of mechanization of the nation's manufacturing facilities through greater use of electric power.

In this effort, too, I pledge the power industry the full cooperation of Westinghouse, not only in our sales activities, but also in enlarged research and development programs dedicated to the creation of new concepts of electrical automation.

With respect to the other factor in the equation of inflation: we must hold the line on wage costs; we must resist increases in excess of productivity. I must confess that this job involves some problems that our efforts to improve productivity do not. One of these is the development of a public awareness of the vital threat to the security of our economy posed by inflationary wage increases. As corporate citizens we will do our

(*Continued on page* 192)

Report on EEI's National Electric Living Program

Introduction

By E. O. George
Vice President, The Detroit Edison Co.
and Chairman, EEI Commercial Division Executive Committee

THE need for a National Electric Living Program became apparent when we saw our sales advantage slipping away from us because of the aggressive promotion of our competitors. We looked ahead and saw if we continued on our course, we would wind up on the reef of declining sales in an expanding market.

Leadership was needed to change our course and the EEI program is now supplying that—providing a rallying point on the national level for local sales activities that will bring the company the increased revenues it is looking for. But, the national programs we create are successful only in direct proportion to their application at the point of sale—right in your own service area.

Sales just don't happen; you have to go out and sell positively and aggressively. We feel the new national EEI program does this. The one thing we need to make it an absolute success is your full and wholehearted support.

We would like to explain the urgent circumstances that led to the development of our program and present some highlights of our program strategy and a few examples of the program elements themselves—elements which require your action to insure success.

The Competition for Energy Dollars

By T. O. McQuiston
Vice President, Metropolitan Edison Co.

I WANT to focus your attention on some facts that indicate why we, the electric utilities, must assume the national leadership in a continuous effort to sell our customers the benefit of all-electric living.

To do this, it is necessary to point out the competitive situation that seriously threatens the growth of our business. It, too, is most important that we realize the fact that much of our future growth is tied to electric heating. Unlike the past selling efforts, our future objectives parallel those of our competitors.

So let us look back in order to look ahead. How does our past sales record apply to three highly competitive heating appliances which are on the market at present?

First is the range. Going back 10 years to 1948, we find that for every electric range sale, the gas industry sold two gas stoves. In 1958, we find a ratio of one electric to 1.4 gas. Admitting this is a gain for electric cooking, it, nevertheless, represents a very slow pace. With our saturation at only 31 percent, it is obvious that it will take many decades to capture the cooking market at the present rate of gain.

Next, let us take a look at water heaters. Here the picture is reversed. From a sales ratio in 1948 of one electric water heater to 1.5 gas, we have slipped, and slipped badly to one electric sale to 3.3 gas in 1958. (Figure 1.)

Presented before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 7, 1959.

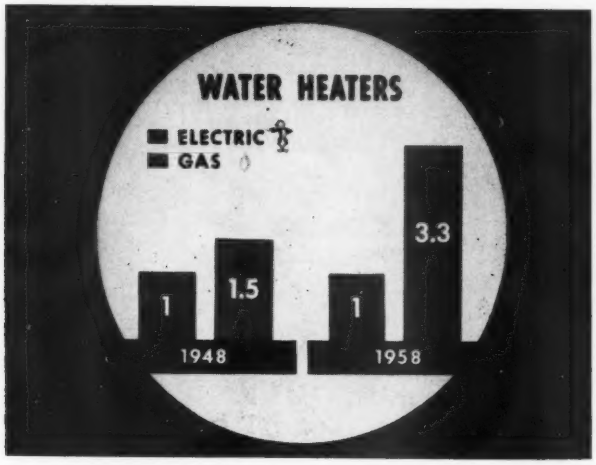


Figure 1

Figure 2

Now, take a look at the third member of the heating family—the clothes dryer. We dominated the market 10 years ago with a ratio of five electric sales for one gas. However, in 1958 the margin declined to two electric to one gas. (Figure 2.)

What do these losses mean in terms of gross revenue?

First, let us consider water heater business. If we had been able to maintain the ratio of one electric to 1.5 gas sales established in 1948, the electric utilities could have added 2,875,000 more heaters than are now on our lines today.

Over the last 10 years this represents a loss of over 56 billion kwhr, or over $703 million in revenue, based on 1¼¢ per kilowatt-hour.

What about the electric clothes dryer? If we had maintained the sales ratio of five to one established in 1948, we could be serving almost 790,000 more dryers than at present.

Over a 10-year period, 1948-1958, it is estimated that our loss in dryer business alone is 2.6 billion kwhr or more than $66 million in revenue, based on 2½¢ per kilowatt-hour.

Added together, our losses to competition in a 10-year period for just two heating appliances—water heater and dryer—amount to 3⅔ million units or almost 59 billion kwhr and a staggering $769 million in gross revenue.

Eyes on the Future

Many of us in the electric utility business can rightly feel proud of our past accomplishments. But we must not be blinded to a competitive threat that challenges our future growth. Our heating objectives and those of our competition are parallel, and these figures indicate that our competition has been highly successful in slowing down our progress.

We might ask about the so-called electrical manufacturer, the electrical distributor and the electrical dealer. Why don't they do a better job? The answer is quite simple. They *are* doing a better job, but not necessarily an electrical one.

They make, distribute and sell appliances, whether they be gas or electric. The word "electric" is a throwback to the old days long before the "battle of fuels" that is being waged on a national scale today.

A survey of electric appliance manufacturers illustrates this point. There are 10 range manufacturers listed as members of the National Electrical Manufacturers Association that sell about 85 percent of all the electric ranges. Of this number, five, or 50 percent, make both gas and electric units. There are 14 members who sell 90 percent of the electric water heaters. Of this number, nine, or 64 percent, make both gas and electric heaters.

Today, 26 companies manufacture electric clothes dryers. Of this number, 21, or 80 percent, sell competitive dryers as well as electric.

Manufacturers' Survey

This survey only covers the so-called electric manufacturers. In addition, there are gas appliance manufacturers who are exclusively interested in the gas market. The point of this survey is to indicate that we, the electric utility, must assume the national leadership in this all-electric movement. While support from all segments of the industry will be forthcoming, we must provide the spark, because we, and only we, are vitally interested in selling electrically to the exclusion of any other method of living.

Let's look back again to 1948. At that time, the average residential kwhr use stood at 1563. At the close of 1958, the average was 3366—more than double in 10 years.

This poses a question: "Can we double in the next 10 years?" According to the present trend line we cannot come close. A projection of this rate of growth indicates that we would only reach 5400 kwhr in 1968. This, of course, is far from double. Actually, it is only 63 percent growth in 10 years. (Figure 3.)

While this trend is significant, there are few of us who will sit back and be satisfied with anything less than 100 percent growth in this decade. We know that our industry has a fabulous future, providing we unite to sell America the idea that people can Live Better Electrically. With electric utility leadership at the national level, plus a firm desire to hold the initiative

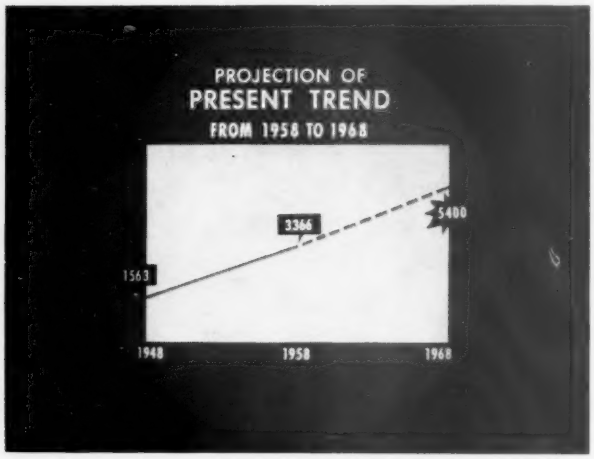


Figure 3

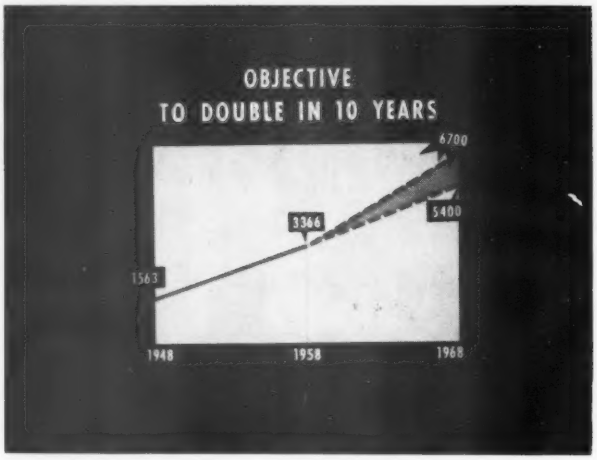


Figure 4

at the local level, it is possible to double the average use by 1968. (Figure 4.)

A Big Order

This, of course, is a big order. It calls for 70 percent increase above our present rate of growth. Obviously, too, it is based on the assumption that the electrical industry will successfully capture the highly competitive heating market, including such heavy load builders as electric water heaters, electric ranges, electric clothes dryers and electric space heaters.

One thing is certain. This challenge cannot be met without space heating. Even if we increase the number of water heaters by 77 percent and electric clothes dryers by 260 percent, the goal for doubling our use in 10 years cannot possibly be obtained.

All-Electric Home

The key to the solution is the all-electric home with electric house heating. In 1958, there was a total of 500,000 electrically heated homes. It is estimated that we need 4 million homes by 1968. This means one out of 14 homes in America must be heated electrically in 1968 in order to reach our goal.

The issue is quite clear and the stakes in the battle of fuels are mighty high. An all-gas home with gas heat, gas water heating, gas cooking and gas refrigeration is worth, to the electric utility, about 1500 kwhr a year. The all-electric home, with electric space heating, electric water heating, electric cooking and electric clothes drying is worth 25,000 kwhr a year. (Figures 5, 6.)

Ratio of One to Eight

A look at the dollars shows that the all-gas house brings us a total of $52 a year, while the all-electric home offers us $425—a ratio of one to eight. (Figure 7.)

With high stakes like these and with a high home-building market in the making, it seems logical and practical to plan big for big business.

The first national promotion sponsored by Edison Electric Institute is a vital step in laying the groundwork for our objective.

Figure 5

Figure 6

Figure 7

NELP Plans, Objectives for 1959

By George W. Ousler
Vice President, Duquesne Light Co.
and Chairman, EEI Electrical Living Policy Committee

TWO rather obvious conclusions can be drawn from Mr. McQuiston's facts.

The first is that the electric industry defenses have not been strong enough to stop our gas competitors from invading the residential market.

The second is that a continuation of the industry's past approach to the residential market will not take us within shooting distance of the 1968 goals forecast by many reliable sources.

What we lacked was a coordinated industry approach to the residential market. We needed to combine the efforts of all segments of the industry; we needed unity of purpose; we needed leadership at the national level, and we needed to plan new strategy.

The EEI National Electric Living Program is the first move in a new plan of action. We in the utility segment of the industry are taking the responsibility of leadership in a national sales promotional activity to sell the all-electric way of living—and sell it to the exclusion of any other method of living.

EEI is sponsoring, administering and financing a basic or core program. Manufacturers and other trade allies have been urged, and will continue to be urged, to integrate their national advertising, over their own name, at their expense, with this basic EEI program. These two elements of the program will produce an industry activity of extensive dimensions.

Two-thirds of the member companies of EEI are participating in this program and have voluntarily contributed over $2.5 million for its support. In our planning stage we estimated that eventually the combined expenditures of manufacturers and other trade allies, cooperating with our program at the national level, would amount to four dollars for each dollar spent by EEI. Based on the interest already generated, we expect to reach that goal very shortly. If this is accomplished the industry will have a $12 million program at the national level.

These are our objectives: to create a consumer preference for the all-electric way of living and by creating this preference, to support industry-wide efforts to sell major load-building appliances, heating and cooling, more and better home lighting, and to accelerate the job of improving the capacity of home wiring. Throughout the entire program, the concept of the current Medallion Home and Live Better Electrically programs will be interwoven.

The following national magazines will carry ads for this EEI program: *Life, Saturday Evening Post, Look and Better Homes & Gardens.*

Daytime television shows give massive, efficient coverage of the housewife and complement the bigger nighttime shows of appliance manufacturers. There are three top daytime shows: "The Price Is Right," starring Bill Cullen; "Young Doctor Malone"; and "County Fair," starring Bert Parks. These shows are appearing on the NBC network.

Consumer messages are reaching millions of homeowners right now—over and over again.

A three-page advertisement appeared in February. It was an omnibus ad including a full line of electric appliances to get across the message of all-electric living. A little rhyme under a cartoon situation read as follows:

"The caveman's mate, we must relate
Was not a happy spouse
Then coal was found, deep in the ground
And brought into the house.
When kerosene came on the scene
The chores became much lighter
And then the gaslight era came
To make things somewhat brighter.
But that's all past and now at last
We're in the modern age
It's ALL-ELECTRIC living now
(For proof, just turn the page!)"

On the next page, the reader saw a colorful spread. It had the caption "Live Better Today—the All-Electric Way." The signature at the bottom read, "Live Better Electrically sponsored by the EEI." A few lines of the copy read:

"The trend's to all-electric. Look around and you will see more and more smart homes going all-electric. Any other way of living is outmoded — because electricity does every job better.

"It's cleaner—it's smoke free—it's flameless.

Think how clean — how safe — how inviting your whole house can be with all-electric appliances. Cleaner kitchen walls. Cleaner kitchen curtains."

Another ad promoted electric laundries. It had the same cartoon treatment and rhyme. The top caption read:

"Launder better today the all-electric way."

It had the same signature as the former ad, Live Bet-

ter Electrically sponsored by the EEI. A few lines of the copy read:

"The modern way to wash, dry and iron is easy—it's all electric. Electricity does every job better. Yes, now you can have a clean, bright laundry—fluffy, feather-soft towels—in the shortest time possible."

Kitchen Advertisement

Another advertisement that will appear in the national magazines promoting electric kitchens has the cartoon treatment and rhyme, the caption being, "Better Kitchens Today—The All-Electric Way," and again, the signature is "Live Better Electrically sponsored by EEI." A few lines of the copy read:

"Can't you just see yourself in a beautiful automatic all-electric kitchen. Your family would love it! Your all-electric kitchen is so clean—so cool—so inviting. Walls or curtains stay so much cleaner . . . your flameless electric range puts the heat in the food, not in the kitchen."

An advertisement that will appear this fall announcing the Light For Living Medallion Home Consumer Contest not only emphasizes the lighting part of our program, but provides strong built-in support for the Medallion Home, appliances, and the HOUSEPOWER program.

HOUSEPOWER Ad

Also, this fall there will be a three-page HOUSEPOWER advertisement in *Life* magazine. This advertisement tells a strong story on the many benefits of electric living. While contractor-installed devices are emphasized, giving promotional leverage to this segment of the industry, it also includes lighting features and tells how full HOUSEPOWER improves electric living generally.

In all there will be 144 individual, 60-second television announcements during 1959 devoted to the selling of all-electric living.

Some commercials give the benefits of owning a Medallion Home, others sell competitive heating appliances and others are directed to the benefits of space heating and cooling.

It is not suggested that this combined, national advertising effort is the big, happy answer to all our residential sales problems. Nothing could be more misleading.

National advertising is a powerful force. But it is basically only a door opener for aggressive *local* follow-through. Our national advertising creates a favorable consumer climate for *local*, face-to-face selling. It provides opportunity for stimulation of local trade elements. But this opportunity must be grasped and used at the local level.

Local Step-Up Necessary

Full benefit from our new national program will accrue to those individual utilities that step up, not relax, their extension of the program through the local trade coordination and local consumer advertising. These will be the companies that will see sales converted to bigger blocks of kilowatt-hours.

And it will be a good job at the local level that will be the key to continuing, growing support, at both the national and local levels, by our industry allies. This will be a critical test of industry leadership.

Another test of this leadership will be our ability to subdue our individual corporate prejudices and recognize the needs of the total industry. This will test our sincerity, as well as our ability to plan and perform for the long haul.

The administration of this program is the responsibility of a Policy Committee, appointed by the EEI Board of Directors.

We were instructed by the Board to conduct a hard-hitting, aggressive, competitive electric program, but to keep it positive in its approach. We believe our program conforms to these instructions.

Preview of 1960 Program

Now that we are on the road with the 1959 program, some of which has been described, we are now in the process of developing plans for 1960. Obviously these plans are only in the formative stage, but we believe the method of approach is pretty well defined.

The job ahead is the promotion of the all-electric home, including space heating, and that is the basic approach we have in mind for 1960. Obviously good lighting and sufficient wiring is a basic element in this approach and these elements will be integrated into the all-electric home concept.

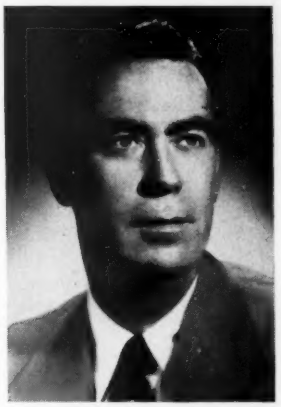
We have made a much-needed and good start with this 1959 program at the national level, but it is only a start. The electric utility industry is big business—over $8 billion of gross revenue in 1958. Big jobs must be tackled with broad activities. I am convinced that our 1959 program will do an effective job but I think that in the very near future an expansion and broadening of this program will be necessary to reach our 1968 goal.

United Approach Needed

The total electric industry is in dire need of a united approach to the residential market. The electric utility segment of the industry has decided to take the leadership in this approach. Manufacturers and other trade allies will be urged to cooperate and integrate with our basic program. Manufacturers and other trade allies will be much more susceptible in this cooperative venture, if all of the member companies of EEI participate in and support the Edison Electric Institute basic program. In other words, we in the utility segment of the industry should show, by example, a united front in order to get complete support from other segments of the industry. I make the plea that all member companies of EEI become participants in the 1960 program.

This is your program. As time goes on, we want your constructive suggestions so that we can develop it into the kind of an activity that will do the most effective job for the electric industry. We need a strong united front to win the severe competitive battle of the future, so that all America can Live Better . . . Electrically.

'Climate Control' in Load Growth or Let's Grow in Comfort



By C. M. Wallace, Jr.
Vice President, Georgia Power Co.

THE subject of "climate control" in load growth is a broad one and lends itself to many hours of study, research, and serious consideration, because here is a tool or a vehicle which, if properly applied and properly guided, can prove to be one of the greatest load-building opportunities in the history of our industry.

How will air conditioning, the heat pump, electric space heating, and other aspects of electric "climate control" affect the growth of the entire electrical industry? What are the best ways to put these developments to work in producing sound load increases that can improve earnings? I wish to point out some of the problems we are facing today in the development of this program, and make some suggestions as to how we can improve the situation and chart our future course.

Major Emphasis on Residential

Any one of these topics could well be the subject of a study or a treatise and I am, therefore, just hitting the "high spots" with the hope that some ideas brought out will arouse some interest in "climate control" and its load-building possibilities. While I will attempt to cover all fields—residential, commercial, and industrial—the major emphasis will be placed on residential, where the potential is perhaps greatest and the benefits more quickly realized.

The adage, "Nearly everyone complains about the weather but no one does anything about it," was apropos until the years immediately following World War II. Since that time, however, many enterprising people in the air conditioning and heating industry, and some in the electrical industry, have sought to do something about the weather, at least within our homes, in commercial buildings and industrial plants, through the application and installation of heating and cooling devices.

Such devices, if soundly applied, properly sold, and correctly installed, do much more than just heat and cool. They also humidify, dehumidify, filter, freshen, and direct the movement of air within the structures in which they operate.

In a very real sense, man has achieved, through the application of heating and cooling apparatus, control of the indoor climate within which he lives, works, and carries on his business.

How will this affect the growth of the electrical industry? I think it beyond dispute to say that air conditioning, the heat pump, electrical space heating and other aspects of "climate control" are, and will continue to be for many years, the catalysts in our load growth. This "climate control" could well become our base load.

Of these spurs to load growth, manifestly air conditioning—that is, summer cooling—was the forerunner. On the Georgia Power Co. system we never had a summer peak until 1953. Up until that time, the peaks came regularly in December. In 1953 came the change and since that year the peak demands have occurred in the summer months. Clearly then, it is air conditioning or summer cooling that has created these summer peaks, and our annual system load factor has been on a general decline since then.

Some may say, "Very interesting, but it can't happen here." (Figures 1, 2.) Maybe not, but, based on a careful and comprehensive study by Middle West Service Co., by 1965, six short years from now, with the exception of 17 states, utilities can expect a summer peak. Incidentally, Alaska is not included in this forecast for 1965—its summer peak will perhaps come a year or two later! Neither have we considered Hawaii in this forecast.

Balance Is Necessary

Without going into a lot of facts and figures, I am sure you will agree that the continued growth of this air conditioning load, or one part of our "climate control," can result in increasingly high summer peaks and decreasing *annual* load factor. Unless we do something to balance this load and achieve full "climate control," we can, in a very short time, find ourselves in trouble.

Now, what about load factor? This is another subject we sometimes talk about a great deal but do little to correct. Let's take a quick look at what could happen to the rate of return in a typical company if load factor is improved by 10 percentage points. (Figure 3.) This company is now earning a 5 percent return. It embarks upon an aggressive "climate control" program of cooling and heating. We have assumed that only incremental produc-

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 7, 1959.

Figure 1

Figure 2

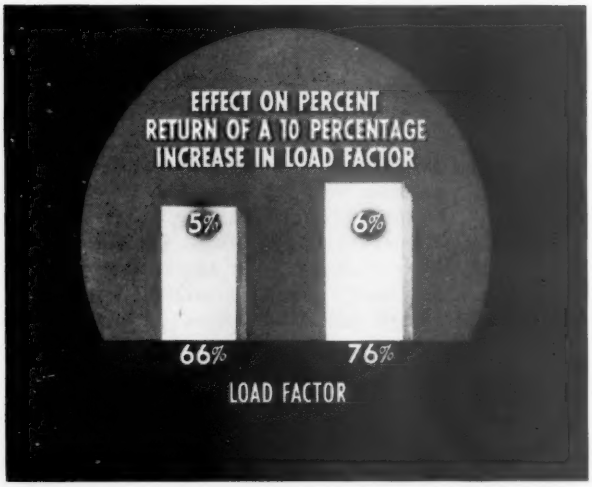


Figure 3

tion costs will be incurred, owing to the increased sales. Here is what could happen:

Calculation of Increase in Percent Return from Load Factor Improvement from 66 to 76 Percent

Data:			
	Electric Utility Plant	$360	million
	Return	$ 18	million
	Percent Return	5.0	percent
	Total Kwhr Sales	4.9	billion
	System Losses	10	percent
	Total Kwhr Generation	5.5	billion
	Load Factor	66	percent
	Kw Peak Demand	950	thousand
	Gross Revenues	$ 83	million
	Incremental Rate per Kwhr	1.4	¢
	Incremental Production Cost per Kwhr	0.4	¢

Calculation:

Total Kwhr Generation @ 76 Percent Load Factor
950 x 8760 x 0.76
6.3 billion

Total Kwhr Sales @ 76 Percent Load Factor
6.3 - (6.3 x 0.10)
5.67 billion

Increased Sales
5.67 - 4.9
770 million kwhr

Increased Gross Revenues
770 x 0.014
$10.78 million

Increased Kwhr Generation
66.3 - 5.5
800 million

Increased Production Cost
800 x 0.004
$3.20 million

Increased Federal Income Taxes @ 52 Percent
(10.78 - 3.20) 0.52
$3.94 million

Increased Return
10.78 - 3.20 - 3.94
$3.64 million

Percent Return @ 76 Percent Load Factor

$$\frac{18 \text{ plus } 3.64}{360}$$

6.0 Percent

The results of this calculation show that a 10 percentage point improvement in load factor can increase percent return from 5 percent to 6 percent; or, each one percentage point load factor improvement results in 1/10 of one percentage point increase in percent return.

Those of us looking for ways and means of increasing our rate of return could well look into this analysis and apply it to our systems. In other words, "Try it on your piano."

I mention rates because they tie in closely with load factor in the over-all problem and particularly in the future.

First, let's say that the term "profit" in the context of the electric utility business means the maintenance of healthy earnings that will produce a fair return on the value of a company's property required to render good service to its customers. For each class of service there is an equitable share of contribution to the company's over-all fair return.

The goal of a good rate structure is one that will produce healthy earnings under varying market conditions now and in the future. The design of rates should put predominant emphasis on future markets and other future conditions.

Rates to Improve Load Factor

Rates that encourage load factor improvement would generally meet these tests, if the promotional feature becomes effective at the load factor where the revenue from the rate structure is already adequately compensatory and the lower or promotional price bears a proper relationship to full incremental generation and other costs, including fair earnings. However, it may be that a load factor pricing pattern, that will be promotional, can include additionally a margin to correct a deficiency in a rate not fully compensatory at certain load factors and bring it up to a compensatory level if higher load factors are thus promoted.

A rate structure pattern which accomplishes these objectives is for the long-term best interest of the company and all of its customers.

More and more utilities are finding themselves with actual or potential substantial summer peak conditions because of summer air conditioning and other weather-related loads. Such conditions should prompt a careful review of rate structures to assure satisfactory promotion of such heating load as will improve earnings which may deteriorate because of the low annual load factors caused by the summer seasonal load conditions. Careful load factor promotional pricing can be of great benefit.

Truly, load factor, that is *annual load factor* with a proper pricing pattern, is a major key to improving and stabilizing earnings.

As has been stated, it can be of mutual benefit to the customer and the company to provide promotional features based upon load factor. The customer is entitled to these lower rate load factor benefits. Again let's emphasize that it is only *annual* load factor that materially affects the company's cost and consequent earnings situation.

Because there are certain important costs that are incurred by the company, regardless of the size of the customer, and because certain unit costs, such as those related to transformation and load densities, decrease somewhat as the size of facilities required increase, pricing in the rate structures can reflect lower unit costs to the customer as the quantities he buys become larger.

From the standpoint of the customer's total annual cost of owning, operating, and maintaining facilities for home and commercial heating and cooling, the cost of fuel—or electricity—represents only 40 to 60 percent of such total annual cost. However, it is the cost which is more often clearly seen by the customer. The Gilbert Report, recently prepared for the Edison Electric Institute, clearly demonstrates this situation, along with the great importance of including and analyzing *all* costs as well as pointing up all of the intangible benefits of electricity over other energy sources.

The Gilbert Report, although keyed in the particular examples therein to military personnel housing, can be a very valuable guide in the economic considerations of electricity vs. other methods of heating, cooling, and cooking in individual homes and apartments, and in commercial applications. I recommend its findings as a useful tool in the over-all promotion of "climate control" and as a powerful sales aid in telling the all-electric story in the residential, commercial, and industrial fields.

I have discussed "climate control" as a load-building device that, if properly guided, can mean great things in the future. Just what is the potential? I would say the potential is unlimited—it can be whatever we choose to make it. For example, over 900,000 residential customers were added in 1958 and this year it is expected that almost a million will be added. In 1958, there were 1,202,000 new home starts and it is expected that this number will be 1,250,000 in 1959. How many of them will be all-electric or total-electric homes? I wish I knew. This I do know: the answer is here in this room, depending on what we do about it. (Figure 4.)

Our potential is pointed up by the fact that the present residential market is the 50 million residential and rural customers now being served. To date, only 1 percent of these customers has central heating and cooling or some form of "climate control"; only 11

Figure 4

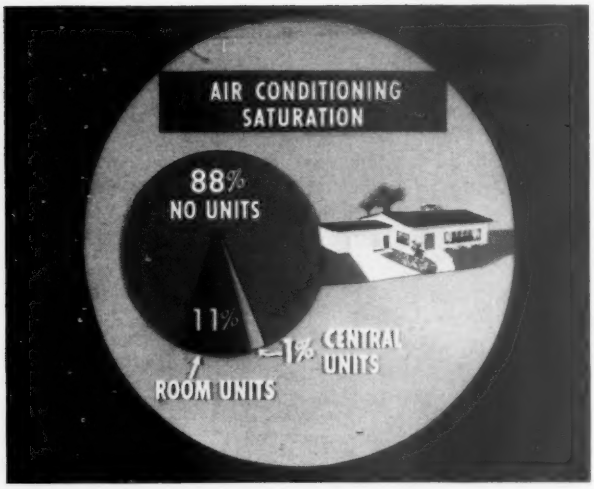


Figure 5

percent have installed room air conditioners, which leaves a balance of 88 percent, a very fertile field for cultivation and development. (Figure 5.)

Not only is it a field that can be developed—it is a field that *must be* developed if we are to achieve the growth forecast and the growth the industry must have if we are to continue to progress. If the industry expects to have a continued rise in residential sales like that experienced in the postwar period, heating and cooling or "climate control" must become a major portion of these sales.

If we are to increase our residential sales in the future at the rate of the past, we will have to build this heating and cooling load at a more rapid rate. In 1959, with an estimated national average annual use of approximately 3,600 kwhr per residential customer, we find that heating and cooling accounts for 1/15 of the residential use. In 1979, the "climate control" segment of the residential load should amount to one-third. This is the job and the challenge facing us. (Figure 6.)

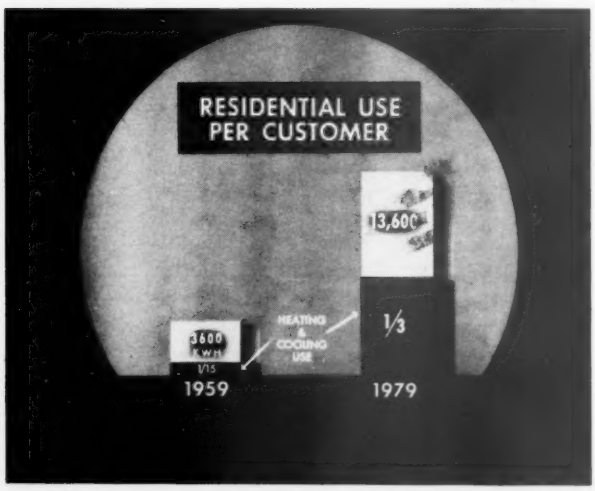


Figure 6

These facts were brought out at the EEI Annual Sales Conference held in Chicago last month: for many years we have pointed with pride to our accomplishment of more than doubling our residential kwhr use per customer every 10 years. That has been true. It's a fine record. In 1948, the national average annual kwhr use per customer was 1,563. Ten years later, or at present, the figure is 3,366. This is good. In 1949, the industry showed an increase of 121 kwhr per residential customer per year, which rose almost steadily each year up to 203 kwhr per customer in 1954. Then a strange thing happened. From 1954 to 1958, the gain has remained steady—some 200 kwhr per year for each of the past five years. I realize there are some explanations for this situation, but not always good reasons.

The point I wish to make is this: unless we do something and do it fast, the industry will not double its residential use per customer in the next 10 years. If we are to achieve the goal of 6,700 kwhr in 1968, we will have to show an average increase at the rate of about 330 kwhr per customer per year. The 200-horsepower job we are driving today isn't good enough. We are going to have to soup up the engine, improve our fuel, train new drivers, and really "scratch off" if we expect to win this race, sometimes held on a dirt track beclouded by smoke and fumes!

"Climate control" is the conversion kit that can put us in high gear and enable us to exceed all previous records and forecasts if we use it intelligently. Why be content to double in 10 years?

At the recent Westinghouse "Future Power Market Forum," which many of you attended, C. J. Witting, Vice President and General Manager, Consumer Products Division, made these interesting observations in connection with the future residential market: the total residential load in 1978 is estimated to be 745 billion kwhr. Lighting will account for 28 percent of the total; prewar appliances 40 percent; appliances developed in the postwar period 9 percent; new products 10 percent; and electric cooling and heating 13 percent.

The significant part of this, however, lies in the fact that in 1968 lighting will account for 31 percent; prewar appliances 48 percent; postwar appliances 10 percent; new products 4 percent; and electric heating and cooling 6 percent.

In only two categories are there percentage increases of growth between 1968 and 1978: new products 6 percent and electric heating and cooling 7 percent. Lighting, prewar appliances, and postwar appliances will show a decrease in the percentage they contribute to the total residential load.

All of this adds up to the fact that if we are to reach our objectives and exceed them, "climate control" is a major part of the picture. Here is where we stand today: one-half million electrically heated homes, with 55 percent of them in the South, 36 percent in the West, 7 percent in the Midwest, and about 1.4 percent in the Northeast. To "make quota" we must have 2.2 million electrically heated homes in 1968 and eight million in 1978.

What then should be our aim to achieve these results?

It should be "get the total load." Electric heating and air conditioning have a tremendous load-building influence on other appliances. Homes, commercial establishments, and industrial plants that have electric heating and air conditioning will, in almost every instance, have electric water heating, electric cooking, electric refrigeration, as well as the miscellaneous electrical appliances. The key to our load-building problem is to get heating and cooling as the *base* load. Let's quit thinking of it as a side effect and the other appliances will follow.

A chart reflecting data taken from AIEE Conference Paper No. CP56-387 shows the monthly average energy consumption of residential customers with and without electric heating. The area concerned is within the 3,500 to 4,500 degree-day area of the country. The houses are all those served by the systems from which these data were taken. Here is the significant point:

The non-heating season use of those customers *with* electric heat is higher than the non-heating season use of those *without* electric heat.

Let's take a look at an industrial application that has "climate control." A garment plant is heated and cooled by 50 tons of heat pumps. It is located in the 3,000 degree-day area. In 1958, this plant consumed 340,160 kwhr. Of that total, 153,520 kwhr were used by plant machinery and lights; 186,640 kwhr were used by the heat pumps in heating and cooling the plant. It had a total demand of 134 kw in January and 134 kw in August.

One more example in the commercial office building field is a building heated and cooled by a heat pump and located in the 3,900 degree-day area. Total consumption for the year was 1,603,200 kwhr. Of this total, 729,920 kwhr were used by the heat pumps and ventilating equipment, and 873,280 kwhr by lighting and other building equipment.

Heat Pump Equals All Others

The kilowatt demands for this same building indicate that the load of the heat pumps is very nearly equal to the load of the other building services.

These three examples, I believe, will indicate to some extent the effect on load growth of "climate control" and the importance of considering heating and cooling as a possible base load, with the other loads filling out the pattern in the residential, commercial, and industrial fields.

The use of air conditioning equipment in the average home today can be increased some 1,800 to 3,200 kilowatt-hours without adding a single kilowatt to the peak load—it's just like money in the bank. You may ask, "How can this be accomplished?" It can be accomplished through humidity control.

Let's back up just a little and look at the seven basic factors to be considered in air conditioning. They are: temperature control, humidity control, air cleaning, air movement, air change, air velocity, noise control. (Figure 7.)

That which we call "air conditioning" today falls far short of this—it is seldom more than temperature control and the matter of dehumidification is provided only as a by-product of cooling.

Most air conditioning units fail to control humidity during the moderate and cooler hours when, although it is humid, cooling is considered unnecessary. Not many heat pumps on the market today can adequately control humidity at night within reasonable limits.

To adequately deal with this situation, a machine or device capable of running at a reduced capacity at night is needed, with the added feature of reheating the air to room temperature, if necessary.

Commercial and Industrial Applications

Not only is this desirable in the home, but, as was pointed out in a report by the EEI Electric Space Heating and Air Conditioning Committee in January of this year:

"In addition to residential applications, there is need for better air conditioning in many commercial establishments and offices. Outstanding examples are restaurants and taverns, where 'sticky' air and 'clammy' air are all too prevalent."

There are also industrial applications such as certain textile operations where humidity control is a must:

"Until recently customers could only obtain tailor-made systems by inducing a local distributor or contractor to face the engineering headaches of modifying units in the field. Usually this was at a price so high that it discouraged all but the most determined. There are now at least three manufacturers offering factory-produced humidity control units. There are also good possibilities in using a separate straight dehumidifier of about ¾ to one horsepower size."

The smaller unit dehumidifiers now available lend themselves to this application.

Here are some of the advantages to the utility of humidity control in the over-all concept of "climate control":

- Increased energy sales with no increase in system demand or capacity.
- Improved annual load factor with a possible and probable increase in the rate of return.
- The prestige of bringing a higher quality of service to customers, consistent with LIVE BETTER, WORK BETTER, PLAY BETTER ELECTRICALLY.

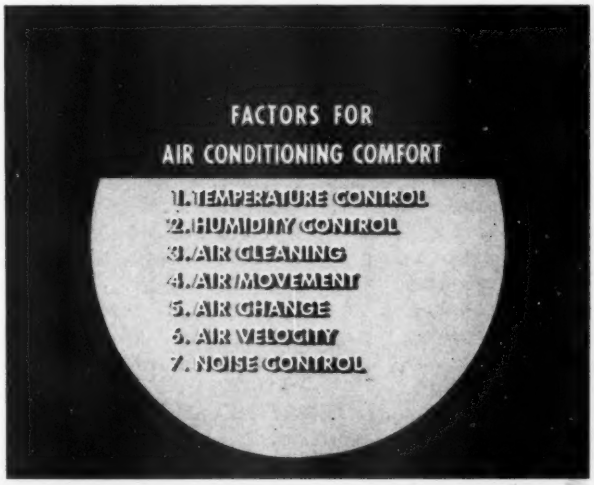


Figure 7

• Improving our competitive position with respect to gas air conditioning.

What benefits can a utility expect to gain from a "climate controlled" residence? I have taken an average $20,000 home in the 3,000 degree-day area and applied Georgia Power Co. rates. Here is what happens:

• Standard installation including lights, refrigerator, miscellaneous—4,000 kwhr per year, or $85.56 annual revenue.

• All-electric, except heating and cooling, 7,500 kwhr per year, or $122.50 annual revenue.

• Same as above, plus air conditioning, 10,000 kwhr per year, or $163.00 annual revenue.

• All-electric with heat pump, 15,000 kwhr per year, or $244.50 annual revenue.

• Same as above, with humidity control, 18,000 kwhr per year or $293.40 annual revenue.

• All-electric home with air conditioning and resistance heating, 20,000 kwhr per year, or $326.00 annual revenue.

• Same as above, with humidity control, 23,000 kwhr per year, or $374.90 annual revenue.

A total difference in revenue over the standard basic installation of $207.84 per year with a heat pump and humidity control, or $289.34 per year with resistance heating and humidity control is indicated.

Humidity Control Adds to Revenue

In each case humidity control has added $48.90 annual revenue.

In addition to these benefits to the utility, the following figures were obtained from the trade in the Atlanta area:

$500 to $600 more appliances in the all-electric home.

$1,100 more for the mechanical contractor.

Up to $1,000 more for the electrical contractor.

It is evident to us that this "climate control" concept will greatly benefit every segment of the electrical industry, plus the mechanical contractor, electrical dealer, and others who can and will become our allies in ever-increasing numbers.

Perhaps the old summer wailing cry, "It's not the heat but the humidity," isn't so bad after all! Unlike the weather, we can at last do something about it, and make the meter turn and the cash register ring while doing it!

If we agree, and I hope we all do, that "climate control" is desirable and profitable, what can we do to make sure that a program of "climate control" will be a success? Here are a few ideas and suggestions:

• Educate all employees at all levels. "Climate control," like charity, begins at home!

• Encourage employee participation in promotional programs and in the use of "climate control" equipment. For example, the Ohio Power Co. does this:

1. The company will defray $100 of the cost on behalf of any employee who purchases and installs a complete electric resistance home heating system in his *new* home; $150 of the cost if installed in an old home.
2. The company will finance the installation, including insulation, storm sash, and wiring, for a period of seven years.
3. The company will defray $300 of the cost of a heat pump installed in an employee's home. The heat pump will be financed for a period of eight years. In the case of a new home only the basic heat pump unit will be financed, but in the case of an old home the duct work, insulation, storm sash, and electrical work will be financed. The employee finance rate is 3 percent per annum.
4. Here's one that lends itself to the singing commercial, "They said it couldn't be done." The company will present a $20 bill to every employee (some exceptions in managerial classifications) turning in a prospect card on a resistance heating or heat pump prospect who is ultimately sold and equipment installed.
5. My own company has recently adopted a similar plan but using cash prizes and trips to Nassau as the incentives.

• Tell the story of "climate control" to college, high school, and youth groups (4-H, FFA, FHA, etc.). These are the home owners of tomorrow. Remove the mystery of electric heating and cooling.

• Educate the architects, engineers, and contractors through meetings, personal contacts, and training schools.

• The utility should take the responsibility of seeing that every all-electric or "climate controlled" home is properly designed, properly insulated, and properly installed. One dissatisfied customer in an area can do more to kill the sound programs we are trying to promote than all the competition we have or expect to have.

• Establish a favorable rate structure, if your present rates do not place you in a favorable competitive position. Do not, however, attempt to sell "climate control" solely on the basis of price. We have something good to sell, something better than any other way of life. Sell the benefits. Keep in mind this fact, that for many years we have sold electric cookery in competition with lower-cost fuel and fuel-burning cook stoves.

• Sell your customer a package job. Get the heating and cooling business as a base, and the other electrical servants and services will follow.

• Develop a sales organization charged with the responsibility of selling "climate control." It should be the job of the utility to have trained sales engineers in the field who are not only able to recognize a heating and air conditioning prospect but who are capable of designing and recommending to the prospect a "climate control" system that will be satisfactory. This requires sales personnel with an engineering background and training, and more training and still more training. We must have at our disposal the means by which we can offer our customers engineered heating, engineered cooling, and, if you please, engineered "climate control." Let's not give them anything else. Let's not give them the "curbstone engineering" that is so prevalent today. Most companies at present handle residential, commercial, and industrial applications through existing departmental channels. I suggest putting these "climate control" engineers under one tent with full departmental status and doing a real job. Such an organization would be headed by a "climate control" sales manager, and re-

(*Continued on page* 145)

The American Way in Tomorrow's World

By Hon. Barry Goldwater
United States Senator from Arizona

WHAT is this nation's most fundamental problem and how does it relate to the difficulties facing your industry?

History—the experience and lessons of the past—should help us as we analyze and search for the right answer to current political problems.

Recently there was an interview in the *Washington Post* quoting that wonderful classical scholar of ancient Greece, Edith Hamilton. Here is what she said about the reasons for the collapse of that once great democracy:

> "I think it was mostly because Greece no longer cared to fight for anything. In the end the Greeks wanted security more than they wanted freedom. They wanted not to give to the state but to receive from the state. They just wanted to be comfortable."

No Time for Complacency

Today we may feel a comfortable sense of security under the protective cloak of our Constitution and Bill of Rights. History, however, should dispel any feeling of complacency we might have. We are not the first people to have written sacred contracts to protect the rights of the individual. Governments in times gone by have thrown up even stronger safeguards than ours against dictatorship, only to see the barriers first lowered, then destroyed as the people permitted more and more power to be concentrated in a tyrant or in an all-embracing central government. And even we, I fear, have forgotten the centuries of fighting and conflict that led to the freedom we enjoy today. The one clear lesson to be learned from the total experience of mankind is the folly of believing that any government, given excessive power, will for long remain benevolent. Government has nothing to give except that which it has first taken away.

America's way in tomorrow's world will depend greatly on the outcome of the contest currently raging between those who believe in "belly politics"—the materialists—and those who believe that man's needs go deeper than material things alone. So much depends on the strength of our belief in principle and our willingness to fight for the things we believe in. I personally have great faith that the dignity and rights of each human being will be preserved even as government itself grows and expands to cope with problems properly in its domain.

Your industry and what happens to it at the hand of government will provide an important clue to our future course. In covering this subject, there is no need for me to take you back over the history of Federal encroachment in your field. One single fact tells the whole story. A short generation ago the Federal government produced less than 1 percent of the power consumed in the United States. Now it produces almost 15 percent, and the ratio mounts steadily.

This trend continues even though the electric companies have made a tremendous contribution to progress in the past and are destined to do even greater things in the future as we move into a new era of electronics and electrical living. You are doing and are capable of doing a good job for the people of this country, yet government is constantly moving in on you.

Why?

Electricity is a complex subject—something very difficult for the people generally to understand. Few recognize or regard it as a manufactured commodity. It does not package and sell like soap or carry a brand name. It has its own particular method of delivery which is unlike other commodities.

Regulation Not Understood

Its technology and economics are highly complex and, therefore, difficult to explain. Even the framework of regulation—state and Federal—within which you operate is not clearly understood.

Moreover, when a man buys or rents a dwelling, electricity is a necessity and taken for granted. Therefore, people seem to have a different economic attitude in buying electricity than they do in buying, say, a pair of shoes, or an automobile.

These characteristics, unfortunately, make the function of supplying electricity easy prey for those who believe government should do more things for people. They argue that electric service can be provided cheaply only by government. This is pure propaganda, of course, for you are providing the American consumer with excellent low cost service.

Yours is one of America's truly great industries. I have had the pleasure of knowing some of your leaders

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and I have found them to be outstanding examples of what businessmen should be. I have found your industry to have a standard of ethics unexcelled by any other and equalled by few. Maybe you have been forced into that, I do not know, but the fact remains you have it.

From my observations, your companies usually take the lead in community development. Your officials are either heading up or assisting in drives for local charities and community betterment. I know of your efforts to create new industry. You have anticipated our future electric requirements for years ahead and are ready to provide it. You have provided us with adequate capacity during every national emergency. You have helped the local and national economy by courageously investing and building for the future at times when more timid souls would have pulled back.

But how much credit does the American public give you as an industry for those splendid accomplishments?

Does Company Get Credit?

When your company is largely responsible for bringing a new industry into your service area, does it get the credit or does that go to some other group of citizens?

Does the public know that it has been industry and not government that has made the technological advances which have kept the price of electricity below 1939 levels?

Does the public know that electric companies serve over 40 percent of our farms directly and furnish power for many of the remaining ones?

Do your customers understand that they pay heavy Federal taxes when they buy electricity from you, taxes that are avoided by those who get their power from Federal or public power bodies?

My point is this: If you received the credit you justly deserve, your troubles would diminish. The public is not going to permit an industry which is a valuable citizen to be kicked around. But it does not realize your value. It appears you have a job to do here.

Another obstacle you face is that your opponents speak with one voice on all issues, whereas you do not. Maybe it is impossible for you to achieve the same unity of action and thought. Perhaps this is as it should be, for the nature of private enterprise is such that it does not lend itself to regimentation and, certainly, it proves there is no "power trust."

But in facing up to what unquestionably is a "public power trust," you must strive for single-mindedness of purpose.

Your opponents are one for all and all for one. They are for government power in any section of the United States and help each other whether their area is affected or not.

I am sure that some electric companies have taken no interest in national affairs that affect the industry as a whole. Others have become active only when some government operation starts breathing down their necks. If you do not make an all-out effort every time a company is faced with government competition or encroachment, even if it is 3000 miles away, you are going to be picked off piece by piece, company by company. Although a company may not seem in danger now, there is no telling when it might be.

There was a time when the vehicle used for government competition and expansion was hydroelectric development; but that time has passed. You now have the atom. That puts the threat of a government power plant in any area, be it Maine or Chicago.

Why are government power advocates so active in supporting Federal development of power from the atom? It is not because of a present or foreseeable shortage of power from conventional fuels. It is not because it means cheaper power.

Look at it this way—the Federal government has constructed steam electric plants in only one area—the TVA. Today it would be very difficult to pass legislation authorizing Federal construction of conventional steam plants in any other area; but the atom is something else.

It is argued, and many people think it is logical, that the Federal government should take the lead in constructing atomic power plants. So the atom may replace hydro as the vehicle to get the government into the steam power business. Your opponents know this; that is why they are working so hard towards that end. Therefore, no single company enjoys the security it once thought it had from the threat of government encroachment. For that reason, it is even more important today that you present a united front in opposing government power developments.

As a businessman who has spent the last six years as a United States Senator with more than a passing interest in your affairs, I have sometimes felt there is a timidity on the part of some utility executives in making contacts in Congress and in participating in utility legislative efforts.

You cannot expect the employees you send to Washington, or those you have permanently stationed there, to work without benefit of your help. This is your job —your responsibility—and you need never hold back or apologize in defending the position of your company and your industry in Washington. In this respect public power is not the least bit modest.

No Place for Timidity

Without question, you are concerned about the efforts being made in Washington to silence you. I would only say this: If Congress doesn't grant some tax relief for your advertising and legislative effort, I hope this won't deter you from participating up to the hilt in such programs. There is no place in this fight for timidity. Those who are timid will lose their shirts.

And these are some matters you can do something about. You have top-flight executives to head up your operating, engineering, financing, and other divisions. Since politics now is one of the most important, if not the most important activity that confronts you, is there any reason why you should not select a top official to handle this field as his primary responsibility? I do not believe you can leave this to an already overworked executive or to your lawyer. It requires full-time attention.

An advantage you have is your coverage. You operate in every state in the Union except Nebraska. I know of no other industry with this same advantage. You have responsible representatives in almost every Congressional district who are, or should be, well acquainted with local officials and opinion leaders.

One of your opposition groups has organized what it calls "Minute Men" to work for its legislative objectives, many of which are designed to put you out of business. It would appear to me that you already have your Minute Men. The question is, are you using them?

Talking with your Congressmen and Senators is a very important function. We are busy people, so never assume that we are fully informed on the subjects in which you are interested. If we are busy and tied up, talk to our administrative assistants. They will get the word to us. But do not be hesitant about coming to see us. Most of you do not come around often enough. Some come only when they want something. So long as your visits are informative and helpful, you cannot visit our offices in Washington too often.

Must Have Votes

You are not going to win issues or stave off disaster without votes, and you do not have them now. Although the climate of opinion with regard to your industry in Washington has improved compared to earlier years, it has not improved enough to prevent your industry from losing ground. I must say you have been remarkably successful on the whole in Washington. And this, in spite of the fact that your industry has only a minority of staunch supporters in the Congress.

It will take votes to stop the trend. I am not suggesting that you run for political office or support candidates of one particular political party. But I do suggest you maintain a continuing interest in the philosophy of those who seek office.

Most legislators who continually support ideas and legislation that lead us nearer the welfare state would be highly indignant if accused of undermining our free enterprise system. But their votes are the more detrimental because the result chisels away at our system of government a little at a time while pretending to support it.

So far we have not even touched on labor and I am sure it ties in with some of your problems that we have been discussing.

Some labor leaders and some of my colleagues consider me a labor-baiter. I am not. I defy the contention that any man in the labor movement or in Congress has any more concern for America's working men and women, both union and non-union, than I have. My concern is for the worker. I fear some of my critics—those who parade as the champions of labor—are more concerned with the personal power of the labor boss and the influence he may have on their political fortunes than they are in the welfare of the worker.

I am not against the labor leader so long as he is the duly elected representative of labor and confines his activities to those things that concern the ones he represents. Where we part company is when the labor boss uses his position to defraud those he represents and to promote his own political ambitions.

As you know, I am a member of a Select Committee of the Senate — the McClellan Committee — investigating labor-management affairs. Some of the things we have turned up are scandalous. Laboring people—members and non-members of organized labor—have been intimidated, beaten and murdered. Money extracted from union members has been borrowed, never to be returned, or stolen outright. Union money has been used to elect or defeat candidates for public office. Criminals have held high office in labor organizations. Criminals, thugs and other racketeers have used organized labor to force their will on employers and on employees who wanted no part of them. Unfortunately, some employers have connived with unscrupulous labor leaders to sacrifice the welfare of the working people.

These things should be corrected by Federal law and yet as widely as these sickening atrocities have been publicized over the past three years, remedial legislation has yet to be enacted. You wonder why? The answer is very simple. The leaders of organized labor have become so politically powerful they are able to stop or to tone down proposed legislation to where it will not do the job.

Do not infer from what I have said that I think all leaders of organized labor are bad. Quite the contrary. The rotten apples we have dug out of the barrel comprise a very small percentage of those connected with labor. But the disturbing thing to me is that even upright leaders oppose corrective legislation because they are afraid it might infringe on their power.

Let any organization once acquire power, it will fight to keep it—that goes for either business or labor. There was a time in this country when business became too powerful politically. It abused that power to the extent that the people in righteous wrath clipped its wings. Now labor has reached the point where its powers must be controlled, otherwise we will soon be under a labor government, irrespective of what political party brand it may use for the purpose.

The State of Michigan has been taken over by labor through its control over the Democratic Party in that state. But labor is not satisfied with Michigan. It spent millions of dollars last year to influence elections in other states, including my State of Arizona, and over-all it enjoyed an alarming degree of success.

Labor and Electric Companies

Now where does all of this fit in with electric company problems? Organized labor should have no specific interest in promoting government power. Its interest really should be with the electric companies. You furnish 85 or 90 percent of union members with their personal power requirements, to say nothing of the power they use on their jobs to increase their productivity. I understand the unions representing your employees have publicly opposed any expansion of government power —Federal, state, or local. They have found their members fare much better under company ownership and operation than they do under government.

One would think with this being the case, other unions not directly connected with the electric power industry would take the same position. But they have not. They oppose the things that might benefit workers in your industry and support all types of government power. They do this in their publications and before committees of Congress.

Why do they? Obviously this stand fits into the general pattern of seeking political favor by seeming to give people something for nothing. Too often people seeking power are willing to cast principle aside in the interest of political expediency.

Government power is paraded as giving something to the people as their due. It matters not that the majority has to pay for it through taxation to give to a minority.

This give-away theory is bait for votes. There is nothing new in it. It was used in ancient times and it is being used today. Votes win elections. If union leaders can influence election of public officials, they build up their own political power and that is their objective. If you have to be sacrificed in the scramble, that's it.

These are among the reasons why it is so important for us to re-define and re-state our values. We can do this and we must if we are to survive.

Where have we fallen down? Why is it that conservatism—belief in the ultimate importance of the individual human being—or free enterprise—call it what you will, finds itself on thin ice today? It is not that our principles have failed, but rather that we have failed to translate them and make them meaningful in terms of today's problems. If we don't find the answer to this, we won't be here tomorrow and there won't be any private electric companies.

A Matter for Decision

The core of this problem, it seems to me, is to decide, and to help people decide, where to draw the line on what the government should do and should not do. The answer is not to have the government do nothing, but to have the government do the right thing.

One thing we have failed to point out convincingly is that government programs are always directed at the group and tend to submerge the individual. Yet when we lose sight of the individual we destroy all the important values we cherish.

We only have to look around us to see how far we have gone in this respect—growth of conformity, the decline of individual incentive, the search for security at all costs—these things are everywhere.

The philosophy of some leading labor officials is the perfect example of what happens when the individual is lost sight of in the search for security for the group. Labor has directed its attention at getting the most benefits, the most security for its group, and within its own framework has deprived the individual of liberty, freedom, and individuality. Where laws permit, the laboring man is deprived of his right to work unless he joins a union. In many unions he has no control over his union dues and is often deprived of the right to elect his own officers. He is deprived of recourse to law and justice through fear of brutality from union leaders. Often he is deprived of his right to feed his family when ordered out on strike, no matter how hard pressed he might be financially and irrespective of his individual desires.

It becomes urgent for us, therefore, to swing the focus of attention back to the individual as an individual.

Obviously we cannot lose sight of the material needs of people, but until we rediscover the individual, we will not make progress. Government cannot be a friend of the people if it ignores the individual.

Where then do we draw the line between government doing things for all the people and the individual doing things for himself? It seems to me this Administration has developed at least one standard to guide us; namely, if people can do something for themselves then there is no need for government to do it.

Now the electric power field is one clear-cut area in which this line can be drawn. You know as well as I do that there is no need for the government to assume a full and complete utility responsibility. Here, without question, people themselves are able to supply the nation's electric power needs.

This is where your interests merge with national policy and this is where your most vital problem of communication lies. And this is why it is important that you continue to exist within the framework of free enterprise, not because you are free enterprise, but because you are not government.

As long as you are not government you still stand for those values which place the individual first, which offer him the greatest opportunity for material and intellectual growth and, consequently, the most freedom and progress. Government cannot do this.

If at times I have given you cause for pessimism, don't think for one minute that I am pessimistic. In what I have been outlining I see hope for the conservative cause. We know with unshakable certainty that what we believe in is good. The pseudo liberals, who argue continually for greater government responsibility, have nothing to offer except more and more government. This is the only road they can take if they remain true to their philosophy. The ultimate result of this course is so obvious it needs no elaboration.

We conservatives, on the other hand, offer the only opportunity to go forward. Our beliefs are founded on proven values—values which have never failed in the past. Conservatism is based on the belief that only to the extent the individual's whole personality is developed to its ultimate potential can society advance in the best interest of all the people. The reason I am optimistic is because I know that what we stand for is sound. Let us never weaken in this belief.

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Government, Industry and Nuclear Power

By Hon. John A. McCone
Chairman, U. S. Atomic Energy Commission

WITHOUT your industry's apparently limitless capacity to meet steeply mounting demands for energy, our country's economic strength and, indeed, our very way of life would have drifted backward rather than moved always forward. Your past achievements are indeed great.

There is a challenge now at hand—our nation's atomic power program. This challenge must be met by you and by me—by all of the power industry, both public and private, and by the Federal government as well.

I am for putting the shoulder to the wheel and making progress toward the goal of competitive nuclear power as rapidly as possible. We have a hard and expensive road ahead of us. At this point I am encouraged by the outlook.

A Common Objective

We must all work for a common objective. This is a development job; and now, when we are struggling to formulate rapid and sensible developmental programs, doctrinaire arguments about public versus private power may well jeopardize our progress. Some day this may become an issue—it need not be an issue in the atomic power business now or for years to come. Therefore, speaking for the Atomic Energy Commission, I invite the effort and cooperation of everyone.

In 1954, just five years ago, the Congress of the United States declared, "Atomic Energy is capable of application for peaceful as well as military purposes." Hence, it established as United States policy that our efforts should be directed toward the development of atomic energy for the general welfare and to raise the standards of living.

The President and the Congress decreed that this great new source of energy should be dedicated to man's betterment—not to his annihilation. This responsibility was placed with the Joint Committee for Atomic Energy and with the Atomic Energy Commission. The former shapes the nation's atomic policy through legislation and acts as "watchdog" for the Congress to see that this policy is properly implemented. The latter is the executive agency. Together the two cooperate in protecting our nation's precious atomic assets. The relationship between the Commission and the Joint Committee is copper-riveted by the wording of the Act that, "the Commission shall keep the Joint Committee fully and currently informed with respect to all of the Commission's activities." Both have by law vast responsibility for our national atomic program.

As one relatively new in the picture, I can detect no basic differences in the fundamental approach of the Commission and Committee in implementing our national objectives. I am particularly pleased with the relationship as it exists today. I am impressed with the thoughtful consideration and seemingly unlimited time that 18 busy Senators and Congressmen are willing to give to overseeing use of this great source of energy for the general welfare of all people.

You are interested in power and my purpose is to discuss nuclear power.

It is my opinion that we lead the world in this technology because I believe we know more about this difficult and at times forbidding science than do men of other nations. In saying this I admit that at least one other country, and possibly two, are producing more kilowatts of electricity from the atom than we are. Moreover, this situation will continue for some time.

The question is often asked, why is this? Are we slipping? My answer is no! Kilowatts at high cost are not important to us. We have the lowest cost power of any principal nation in the world. Moreover, we have abundant supplies of conventional fuel. What is important then is to advance "know-how"—to be there first with the cheapest and most dependable atomic power. This calls for steady, rapid development. It does not call for large quantities of kilowatts.

High-Cost Atomic Power

Other countries, less fortunate than we, have allowed themselves the luxury of high-cost atomic power produced in first-generation plants. By doing so they may better their power costs, save imports of fuel, stop drains on their currency and, by coupling the production of plutonium and power into a single plant, produce weapon materials to meet their needs.

This policy makes good sense for them, but not for us. Had we made a similar decision, our great plants at Hanford and Savannah River could be producing millions of kilowatts of power in addition to plutonium. However, these kilowatts would be expensive by our

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standards. In my opinion a national liability rather than a national asset would have been created as a result of the high cost of the power produced.

Basically, we must create atomic power according to our needs and from plants which will produce this power competitively. This accomplished nuclear power will take its place naturally in meeting the needs of your customers.

Competitive Nuclear Power Possible

Is competitive nuclear power possible? My answer is yes—nuclear power will one day support our ever-expanding industrial growth.

I, for one, was not swept along by the unwarranted enthusiasm of the early 1950's. Likewise, I am not persuaded by the gloom and despair so frequently expressed today. This viewpoint, you will recall, pervaded Geneva last August and Vienna in September. I am convinced from long, hard study of this problem that atomic power will be competitive and therefore useful in the United States at an earlier date than some think.

I am further persuaded that the need for this source of power is such that we must promptly overcome the technical problems. The government in our national interest must see that this is done. The electrical industry, both public and private, in the interest of meeting their ever-growing demands, must also work with unrelenting effort toward the perfection of these processes. When this task has been accomplished, the atom will provide an increasing proportion of the growing demand for electrical energy.

There is now broad agreement on the basic objectives of the nation's atomic power program. This agreement results from many studies. It results from the thoughtful work of the staff of the Joint Committee on Atomic Energy as expressed in its report of last August. It results from the studies of the Edison Electric Institute and the excellent reports which they produced. It results from work of the Atomic Energy Commission and the findings of the Ad Hoc Committee I appointed early last fall.

Each of these groups sets forth objectives—each in its own words—after carefully considering the importance of nuclear power to our own power needs, to our world position and, finally, after weighing the hard, tough scientific and engineering problems which must be solved.

Briefly, there is now broad agreement on the following statement of objectives and these represent national policy:

- To reduce the cost of nuclear power to competitive levels in high energy cost areas of this country within 10 years.
- To assist friendly nations now having high energy cost to achieve competitive levels in about five years.
- To support a continuing long-range program to further reduce the cost of nuclear power.
- To maintain the United States position of leadership in the technology of nuclear power for civilian use.
- To develop breeder-type reactors to make full use of the nuclear energy latent in both uranium and thorium.

Before looking at the future, let us take inventory of our present situation.

Despite frustrations and disappointments, much has been accomplished. Results point the way to accelerated progress. We are experiencing better plant performance than anticipated. This, then, is the basic reason for my hope and my optimism.

Seven experimental power reactor plants are now in operation. They have performed well. They contribute valuable, first-hand operating information. By and large they perform better than the scientists and engineers expected.

Let me give you a few examples.

The experimental boiling-water reactor at Argonne, a simple plant designed to produce 20 megawatts of heat, has vastly exceeded its design capability. The reactor has since demonstrated a capability to operate at 60 mw. Now the Argonne laboratories are installing a new core of much higher power density. They hope to produce 100 mw of five times the design capacity of the original plant which itself is unaltered. What is accomplished here can be incorporated in the design of all boiling-water reactor plants of the future. The downward effect on the cost of power will be dramatic.

I am told that Vallecitos, the General Electric Co.'s experimental plant in California, has exceeded its design power level and is capable of further increases.

Shippingport, a pressurized-water plant, and the largest of its kind, has been operating now for 16 months. Despite all that has been said concerning Shippingport's high cost, this plant has served an indispensable purpose. Out of it is coming vast amounts of solid, dependable information not otherwise obtainable.

Shippingport also is demonstrating unexpected growth. It is operating at 60 mw electrical, but designed with the hope that it might some day produce 100. The second core presently being fabricated for the original plant is estimated to produce 150 mw. I think it is a good bet that the third core may even exceed that.

These are the hopeful results of the early operation of the plants which are on the stream. But there are other indications to give encouragement. We have operated 11 naval propulsion reactors, some in land prototypes, others in submarines. Every one has performed with remarkable dependability. Each has exceeded expected power output. Additionally, successive cores indicate dramatic improvement in the core life span, thereby correspondingly reducing fuel costs.

These are all encouraging factors. They are not theoretical. They are solid results and dispel some of the gloom of Geneva.

16 Plants Authorized

Sixteen plants incorporating eight different reactor concepts have been authorized for construction by the government or by industry in addition to those now in operation. These new plants, some of them large, most of them relatively small, will, when completed, produce about 1 million kilowatts electrical and will cost in excess of $500 million.

The plants under construction are, for the most part, on schedule. Dresden, a 180-mw, boiling-water reactor, will be completed this year. Yankee, a 130-mw, pressurized-water plant will be completed on schedule next year. It will be followed in 1961 by the Consolidated Edison Co.'s giant 255-mw, pressurized plant at Indian

Point. Pacific Gas and Electric Co.'s Humboldt Bay Plant, the Northern States Plant with nuclear superheat and the Elk River Plant are all under construction and should be completed in two years or a little more.

These projects, in my opinion, represent real progress in the water concepts. Much will be learned from their operation. But even now known technology indicates a need for additional plants designed to demonstrate new technical advances. Therefore, it is our intention to proceed promptly with additional plants of the water type and we have such proposals before the Congress at this moment.

Quite a different concept, the graphite-moderated, sodium-cooled reactor experiment built by the Commission at Santa Susana, has operated reasonably successfully for over a year. From the information gained in this reactor we are proceeding with the design and construction of a 75-mw plant for the Consumers Public Power District in Nebraska to be completed in 1961. This reactor concept is of special interest because the outlet temperatures are high and the steam conditions better than can be achieved in several other concepts unless superheating is proven to be feasible and economical. Further development of this concept requires a larger, more elaborate and more flexible sodium graphite test reactor. This will be built if studies indicate that we should further pursue the sodium-cooled concept.

The organic-moderated reactor experiment in Idaho has proven the feasibility of this process. Although results to date are admittedly meager, we believe this reactor type is worth further development. We, therefore, are proceeding at once with design and construction of a small commercial megawatt organic-moderated and cooled plant in Piqua, Ohio. If successful, organic-cooled plants will be relatively simple and, therefore, cheap to build and operate. Also, because the organic moderator and coolant does not become radioactive as it circulates through the reactor, the plants will be less hazardous than other types. An additional experimental reactor, larger and more flexible than the existing one, must be built promptly to advance this process. The Commission has proposed this to Congress as a part of our current program.

A Fascinating Prospect

"Breeding," or producing in a reactor more fissionable fuel material than is consumed, is a fascinating prospect. When this can be done economically and safely, a new and important milestone in atomic power will have been reached. Our program in this area is encouraging. The second experimental breeder reactor is under construction in Idaho and will be completed, together with its full-integrated pyrometallurgical reprocessing facilities in about a year. The 90-mw Enrico Fermi Plant of this type is advancing rapidly. It is about 50 percent complete now and should be ready for operation in 1961.

Heavy-water reactors are important because they offer the best means of using natural uranium for fuel. Foreign countries would prefer not to be dependent on the United States or Britain for enriched fuel. Domestically, natural uranium lessens the potential competition between the nuclear-power and the weapons programs for available U-235. Also, heavy water offers economic advantages stemming from greater economy in the use of neutrons. Therefore, we place great importance on our heavy-water program. We are building two test reactors, one at Savannah River, one at Hanford. We have contracted for development leading to a heavy-water, gas-cooled plant in Florida and for the construction of a heavy-water cooled and moderated plant in South Carolina. Furthermore, we have important cooperative arrangements with Canada in this field.

There have been disappointments for you. The Joint Committee and the Commission have had their disappointments also. I believe many of these disappointments have been caused by non-recurring events. Some grew out of the over-enthusiasm of 1954. Some serious ones have grown out of the fact that costs have exceeded original estimates by an average of 50 percent and in some instances 100 percent. Another frustration has been caused by delays—delays by industry in arranging its plans and financing, delays by the Commission in evaluating proposals and in securing authorization.

Business Better Understood

However, we know more about this business now than in the past. Estimates can now be checked with actual costs experienced in a dozen locations. Government procedures, difficult under the new laws and regulations of 1954, are now understood by all parties concerned. Finally we have an agreed set of objectives to guide us. We can now move along much faster.

An area of great importance is the gas-cooled reactor. Great Britain has built its nuclear program around this concept. However, at the low temperatures to which they are limited today, there has been little incentive for the United States to build gas-cooled reactors—they are costly, their steam conditions are comparatively poor and their power costs high.

More recently, there is evidence that gas-cooled reactors can operate at considerably higher temperatures, thus improving their relative economics. Therefore, we propose to build them. We have asked Congress to authorize building a highly flexible graphite-moderated, helium-cooled reactor. This plant will be built on a Commission site as a test reactor and a power producer. This will be a valuable tool and useful in the entire field of gas-cooled reactor technology.

Concurrently, we are asking Congress to authorize the construction of the high-temperature, gas-cooled reactor proposed by the Philadelphia Electric Co. and the General Dynamics Corp. This plant will be privately financed. It will be supported by a group of some 52 power companies. The Atomic Energy Commission, for its part, is to provide $14.5 million for research and development assistance. This reactor is a bold and courageous step, for we are venturing into temperatures heretofore unattained. However, it has been carefully studied and is considered by us and by the sponsors as a good risk.

If successful, and I have every reason to believe that both of these projects will be, we will have taken a giant step in this very important area.

Let us look into the future.

The problem immediately at hand is to produce competitive atomic power at the earliest date. This, in our

opinion, will be done first in plants in which the uranium fuel is consumed just as coal is consumed in a boiler. There are countless possible reactor concepts which seem to evolve in the minds of scientists and the engineers. At one time it was felt that almost any promising concept could be proven by a small experimental reactor and a certain amount of research and development effort. We have not found this to be the case. The experimental reactor, in answering some questions, has a habit of asking a great many more. This, then, calls for another experimental reactor and then another, or perhaps a small demonstration generating plant. We believe that each reactor concept must go through an evolution of development. Experience has proven to us that no easy shortcuts are to be found. The great pressurized-water plants at Yankee and Consolidated Edison were preceded by a number of naval reactors, all pressurized-water but varying in size and construction detail, and also by Shippingport, itself a prototype. Therefore, one might say there was a wealth of practical experience and knowledge in the hands of the scientists and engineers as they developed the designs and built these two major plants.

The same is true of Dresden Boiling Water Plant, for this plant has benefited from the four experimental BORAX plants, as well as the Experimental Boiling Water Reactor at Argonne and the Vallecitos plant.

Improvements Incorporated

If similar reactors were started today, they would obviously incorporate improvements lowering both plant and fuel costs. But it would be a courageous man indeed who would incorporate into a very large plant some of the recent developments, such as higher power density cores, improved methods of containment and simplified systems of circulation, until these novel ideas have been demonstrated in smaller plants. When demonstrated, then these ideas must appear in large plants if the full potential of the developments is to be realized.

For this reason we argue for the immediate construction of prototypes. These prototypes will be the smallest plants which can be built and still prove the particular technical advances on a scale which will permit extrapolation to plants of large size. The proportions of the prototype will depend to a large extent on the technology being demonstrated. For the most part they will range from 30 to 80 mw.

The advantages of building prototypes rather than large plants during the developmental stage are manifold. First, they can be built relatively cheaply. Therefore, they save you or the Federal government, or the taxpayer, a substantial amount of money. Second, since they are cheaper, we can better afford new technical features—at a risk to be sure—and, in this way, sharpen up the technology. Third, they can be built in less time. Proposals in our hands indicate plants of this size can be designed and built in two to two-and-one-half years. On the other hand, the estimate for a large plant is four years after financial arrangements have been completed. Finally, prototypes require far less uranium fuel. For these reasons, changes and improvements can be made without great economic disturbance.

We, therefore, feel a series of prototypes should be built. They must be carefully selected, they must be looked upon as the essential building-blocks which go into a completed structure. Each prototype must play its part in demonstrating technological advances; it must prove that these advances, when incorporated in large plants, together with the advances proven by other prototypes, will result in a large plant which will be both reasonable to build and capable of producing economic power.

This will make for some hard choices, the decision to construct or not to construct a particular prototype will surely influence the program. If Federal funds are involved, this decision must rest with the Atomic Energy Commission. This is not to say that industry will not build developmental plants in the future, as they have in the past. And I can assure you that there is no desire to duplicate at the taxpayers' expense the developments made by industry. Thus, we will give industry every encouragement to proceed on its own, rapidly and economically. Where we can help, we will. And when we do help, we will find ways of giving help without slowing down or delaying your own progress.

I know that plants of the size I have discussed do not appeal to most of you for the simple reason that they are costly and their power is far from competitive. For that reason we are advocating capital assistance to offset the difference between the initial cost of the plant and the estimated cost of a conventional plant. The Commission has advocated a capital grant which could make up a large part or all of this difference. Others have advocated capital grant plans which range from 75 percent to 90 percent of the difference. This matter can be resolved. The important point is to do those things which are necessary to advance the program. It is also important to recognize that the proposed capital grant is limited to essential prototypes which, in the opinion of the Atomic Energy Commission, will advance the particular concept involved.

Goal: No Government Assistance

We feel that once this is done—that once, by means of this assistance, we demonstrate the ultimate possibilities of atomic power—then industry, both public and private, will build the very large commercial plants for incorporation in your respective power systems. Industry can and will build these plants with no government assistance. That is our objective—our final goal.

The long costly succession of experimental and prototype plants necessary to perfect a particular concept raises the question as to just how many types of plants industry and the government should support. There is no shortcut in this business. It will cost about $350 million to carry one of the advanced processes to a point where we can reasonably expect cheap power. This is the figure for boiling water. It probably will cost even more for pressurized water, but this figure is hard to develop accurately because the development is comingled with our naval reactor program. I believe it will be still more expensive to fully develop some other concepts.

This, then, makes it necessary for us to determine objectively and carefully the potentialities of a concept. A process must clearly demonstrate that it will produce

power more quickly, more safely, or at a lower cost to warrant our support. We must be highly selective in moving forward into the more expensive developmental steps. We must do so only with the most promising concepts. I do not mean to infer that we will adopt the course of pursuing only one concept as Great Britain has done. However, I do think we should limit our efforts to four or five concepts which offer special and significant incentive to our national interests. This is not an easy choice. As my fellow Commissioner John Graham says, "It is difficult to select an all-American end out of a group of grammar school kids." But we feel the factors that control the cost of nuclear power are now clear and hence the yardstick of realism can now be placed against the larger number of reactor concepts which are under study.

Beyond the non-breeding thermal plants are the so-called breeders. I have discussed one of them, the fast breeder. There are also thermal breeders, in which the fuel passes through the reactor in a liquid state or in a slurry. In addition to being potential breeders, these concepts have the additional advantage that their cost of fuel fabrication is small. We have experienced more difficulty with these reactors than we had anticipated. For that reason, we are going a little slow on hardware and are emphasizing research and development. We feel this type of plant, as a useful commercial power producer, is a decade away, or perhaps more. When it is perfected this will be a great step forward. However, we do not believe that breeders in general will render non-breeders obsolete.

Power from Fusion

Finally, as the third stage in this development, we see power from thermonuclear fusion. I think all will agree that the optimism once expressed over this possibility was unwarranted. The scientific and engineering problems are far more difficult than once thought. But there is no question in the minds of the scientists that these problems will be overcome and that this unlimited source of energy will be available to mankind. When this may happen is hard to say. Dr. Teller, for example, now does not expect power for the consumer from the thermonuclear fusion during the lifetime of many of us.

I want the continued help of this great industry in furthering this nation's atomic power program. You must build plants and place them in operation on your power grids. Only by doing so can the compatibility of the nuclear plant and the power demands of utility systems be demonstrated. You must help with your knowledge; your technical and engineering resources are vast.

And finally, you must recognize that the only solid knowledge of value to you and to your organization will come from actual experience with the building and operation of a nuclear plant. Too often the executive or the economist who admittedly must work with cost figures whittled down to a mill, or even a fraction of a mill, rejects the idea of atomic power because on a pro forma first-year basis it looks uneconomic. Conventional power costs projected for 25 years with fossil fuel costs increasing each year, as they surely will, must be compared with nuclear costs projected for a similar period. During this plant life span, atomic power costs will come down when fuel fabricating and processing techniques are moved from the job shop to the production line. Atomic power then does not look so "non-competitive." Add to this evaluation the intangibles of training and of experience and then ask how your stockholder is to fare when coal or oil are not so readily available as they seem to be today.

Then, I believe, with all of these factors properly in focus you can only conclude, as I have, that atomic power development deserves and must have your continued vigorous participation.

Climate Control in Load Growth

(*Continued from page* 136)

porting to him would be specialists in the residential, commercial, and industrial fields; a service representative—one familiar with service problems and able to coordinate the activities and training of utility service men or those of servicing organizations; a dealer representative or coordinator who would train, promote, and develop an active dealer organization.

- Encourage and develop a strong dealer organization—one that is able to sell, install, and above all, service the equipment he sells.
- Last, but by no means least, accept the responsibility for the service to "climate control" equipment:
  1. Through contract to handle in-service-warranty with appliance repair personnel.
  2. By servicing equipment when outside the guarantee at reasonable, yet profitable, rates.
  3. Through an independent service organization with the responsibility for assurance of adequate service resting with the utility.

These are things we can do and the things we must do to the best of our ability, if we are to succeed in keeping our industry in the forefront in the days ahead.

We can expect even tougher competition in the future. The gas industry does not intend to sit idly by and let us take over the summer air conditioning business—they, too, need to improve their annual load factor and have been very active in research, development, and promotion of air conditioning equipment, particularly in the residential field. Each year their promotion and advertising become more and more aggressive. It is not easy competition now, as many of us can attest, and you may be sure it will be even more difficult and competitive in the future to sell air conditioning, unless we tell the story of "climate control" with its many advantages and benefits when done the all-electric or total-electric way.

What about a projection of the industry's installed generating capability and demand to 1965? The trend for the past few years is simply projected out six years. It presents a beautiful picture and an optimistic outlook. But this trend can change. I am certain it will change downward if we do not become actively engaged in dynamic and aggressive selling and development in the cooling and heating market—the "climate control" market. I am also certain that it will change upward if we do.

Atomic Power: a Status Report and a Look at the Future

By Elmer L. Lindseth
President, The Cleveland Electric Illuminating Co., and Chairman, EEI Committee on Atomic Power

Mr. Lindseth's report and the four subsequent articles are the essence of a panel discussion on atomic power presented at the Third General Session of the Twenty-Seventh Annual EEI Convention in New Orleans, April 7.

DURING the past year the industry and the nation continued a vigorous expanding program of nuclear power development, aimed at making nuclear energy a practical, economic source of electric power.

On the technological front, our industry program continued to show substantial progress and further expansion. Within government there began to take shape long-range national objectives for nuclear power development and certain steps in a technical program to achieve these objectives. Also emerging was some clarification of the respective roles of government and industry in the future course of nuclear power development.

Investor-Owned Utility Program

Today, three nuclear power projects in which electric utilities are participants are in operation; 10 utility-sponsored projects are under construction or in various design stages; and two additional projects are in the planning stage. Utility company expenditures on these 15 projects will amount to more than $540 million, exclusive of excess operation and maintenance costs over equivalent costs of conventional power. Such excess costs may, over a period of years, approach a substantial portion of excess capital costs. These additional post-construction operation and maintenance costs are frequently not recognized in evaluating the overall contribution by our industry to nuclear progress.

Details on the projects underway in the industry and a summary of dollar expenditures are shown in the attached tables.

A large number of utilities are also participating in 11 other nuclear research, development and study projects, involving substantial expenditures. Some of these will undoubtedly lead to additional reactor construction projects.

As of year-end 1958, total utility company expenditures in these and the previously mentioned projects amounted to $130 million with 131 utilities participating. A listing of the participating companies in each of the 26 projects is shown in the accompanying tables.

During the year a proposal was made to the AEC by the Philadelphia Electric Co. and the newly formed High Temperature Reactor Development Associates to design, construct and operate a 30,000-40,000-kw (electrical) high-temperature, helium-cooled, graphite-moderated nuclear power plant at Peach Bottom, Pa. AEC accepted the project as a basis for negotiations.

General Public Utilities Corp. also announced that it would construct a 5,000-kw (electrical) developmental, water-type reactor at the Saxton, Pa., generating station of its subsidiary, Pennsylvania Electric Co.

In December, 1958, Pennsylvania Power and Light Co. and Westinghouse Electric Corp. advised the AEC that after three years of research and development work on the single-region slurry homogeneous reactor, they did not think it technically feasible to construct their proposed large-scale, homogeneous reactor without the development and operation of a prototype plant. This resulted in the cancellation of the project (PAR).

During the year research and development work continued on the recently inaugurated Carolinas Virginia and East Central Nuclear-Florida West Coast projects, now under contract with the AEC. Detailed design work commenced during the year on the Pacific Gas and Electric Co. plant located at Humboldt Bay, Calif., as well as on the nuclear superheater plant of the Northern States Power Co. to be built at Sioux Falls, S. D.

Two Near Completion

Major construction work on the large-scale Dresden plant at Joliet, Ill., the Enrico Fermi plant at Monroe, Mich., the Yankee plant at Rowe, Mass., and the Indian Point, N. Y., plant continued toward completion and operation, in 1960 in the case of the first three plants and in 1961 for Indian Point.

Valuable operating experience was obtained by the electric utilities participating in the three operating power reactor projects located at Vallecitos, Calif., at Santa Susana, Calif., and at Shippingport, Pa.

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 7, 1959.

TABLE I—ELECTRIC UTILITY COMPANY PARTICIPATION IN NUCLEAR POWER DEVELOPMENT
PLANTS IN OPERATION, MARCH 15, 1959

Name of Participating Utility Company and Plant	*Type of Reactor*	*Electrical Capacity of Plant—Kwe*	*Owner of Reactor*	*Operator of Reactor*	*Estimated Cost to Utility Organization*	*In Operation*
(1) Duquesne Light Co. (Shippingport)	Pressurized Water	60,000 (*a*)	Atomic Energy Commission	Duquesne Light Co.	$25,081,000 (*b*)	Dec., 1957
(2) Pacific Gas & Electric Co. (Vallecitos)	Boiling Water—Prototype for Dresden unit	5,000	General Electric Co.	General Electric Co.	572,000 (*c*)	Oct., 1957
(3) Southern California Edison Co. (Santa Susana)	Sodium Graphite	7,500	Atomic Energy Commission	Atomics International	1,573,000 (*c*)	July, 1957

(*a*) Initial net capacity, ultimate of 100,000 kw gross expected.
(*b*) Includes $20.08 million for the conventional portion of the plant and the site, and $5 million toward cost of reactor.
(*c*) For turbo-generator portion.

This, in essence, is the status and progress on the industry program in nuclear power today.

Recent Developments in Washington

Within the last six or eight months, both the AEC and the Joint Committee staff of the Congress established proposed objectives of national atomic power efforts and program steps to reach the objectives. Both sets of objectives are similar, and briefly are: (1) to achieve and demonstrate economic nuclear power in 10 years in the United States; (2) to assist friendly nations now having high energy costs to achieve competitive levels before that time; (3) to maintain U. S. world leadership in the peaceful applications of atomic energy.

Both proposed programs called for strong leadership and technical direction by the AEC. To bring this about, the Joint Committee staff program envisioned government assumption of responsibility for construction of reactor experiments and prototypes with participation in this phase by industry only in exceptional cases. Private ownership of nuclear facilities was anticipated mainly for second generation, commercial size nuclear power plants.

During the year, the AEC had demonstrated its intention to exercise stronger leadership and technical direction by announcing the policy whereby it would specify to private industry the types of reactors to be built with government assistance. Theretofore the initiative had rested largely with industry to propose reactor projects for inclusion in the Power Demonstration Reactor Program and, thereby, qualify for government aid. In order to encourage participation by industry in the building of promising prototype reactors, the AEC endorsed capital subsidy as an additional form of financial assistance.

The technical phases of the two proposed programs differed somewhat as to the recommended sizes and types of reactor projects. The Joint Committee staff program included a list of experimental, prototype and large-scale reactors to be studied, developed and possibly built. The AEC, on the other hand, emphasized the building of reactor experiments and prototypes rather than large-scale plants as the quickest, least costly course toward achieving the program objectives. It also placed greater emphasis on the importance of breeder type reactors.

It was against this background that the Congressional hearings on the development, state and growth of atomic energy convened in February of this year. Chairman McCone of the AEC, in presenting the Commission's program for nuclear power development, reported that "efforts during the past five years have paid off in remarkable progress." He went on to say that "we have had a good program, both in terms of technical progress and in terms of participation and cooperation of industry."

The AEC continued to advocate positive and vigorous leadership in all phases of the program. In the research and development phase, the Commission would make full use of the technical staffs of its own laboratories although it also stated its intention to call on all segments of industry which could make substantial contributions.

In the prototype construction program, the AEC would determine desirable reactor types, sizes, designs and schedules for construction to meet their program objectives. The AEC would specify to industry the desirable prototype reactor projects which would qualify for government assistance. Financial assistance would be offered to cover capital costs in excess of conventional plant costs, if such authority were approved by Congress. However, such financial assistance was not to exceed 50 percent of the nuclear plant costs up to the bus bar, nor to reduce the capital cost to industry below the equivalent cost of a convenional plant.

Additional Objective Recommended by EEI

In the statement presented in behalf of the Edison Electric Institute, we endorsed the major objectives of the long-range, national program proposed for nuclear power development. However, we recommended an additional objective which has not received adequate consideration to date—to bring the development of atomic power as soon as possible and as nearly as possible within the framework of commercial development of conventional energy resources. It is our position that healthy ultimate utilization of atomic energy will only take place with electric power companies, manufacturers of equipment and other related industries working together, without the requirements of special restrictions, special forms of assistance, and the extent of direction by government which presently exists during the transition period to economic nuclear power.

It is obvious to our industry that while the program currently under way in the United States is progressing at a rate which is both substantial and adequate on the basis of domestic considerations, foreign policy objectives may require additional efforts. However, such additional efforts are a collective responsibility of all segments of the economy. The electric power companies recognize their responsibility in these efforts and will continue to make available to the fullest extent possible their resources in experience, organization and financial support to help achieve the nation's foreign policy objectives in nuclear power development.

Federal Participation Required

But, we pointed out that broad-scale industry participation in expanded programs to meet the nation's foreign policy objectives will require substantial participation, both financial and otherwise by the Federal government. Such assistance is both desirable and necessary, inasmuch as it is in support of an objective important to the entire nation rather than for the benefit of any one group. The principle of Federal financial aid to promote international objectives has abundant precedent for such aid in nuclear power development.

With regard to the role of government in technical aspects of nuclear power development, it is our industry position that during the transition period to competitive nuclear power, the AEC will have an important part to play in virtually all aspects of reactor development. However, we advocate that that role should be a transitional one with such responsibility transferred to industry as soon as practicable.

The AEC's role in reactor development over the near-term should be in the areas of investigating promising reactor concepts, sponsoring research and development, and constructing and operating reactor experiments and prototype reactors. AEC ownership should not extend beyond the stage of such reactor experiments or prototypes at Commission installations. It is basically undesirable for government to own reactors on utility systems, public or private, such as was provided for on public and cooperative power systems in the so-called second-round invitation of the Power Demonstration Reactor Program.

In a free enterprise economy, as a matter of principle, there is no proper place for government furtherance of public power, atomic or conventional, with financial assistance or other aid. When this is done it can only occur as a matter of expediency.

Moreover, power reactors at AEC installations should be operated only so long as they are deemed to be valuable from a research and development standpoint. In many cases the inclusion of electric generating facilities is not necessary for technical progress. In those cases where generating facilities are installed, power generated, of course, should be utilized at the site.

Hence, in carrying out any program deemed necessary to meet established objectives, the respective roles of government and industry should be so conceived and administered as to maximize participation in the ownership of facilities by industry. Projects proposed by the AEC involving either prototype or subsequent reactors should be submitted to industry to be constructed, owned and operated by industry, with sufficient government financial assistance provided to bring this about.

Likewise, projects initiated by industry should be given equal consideration for government assistance

TABLE II - ELECTRIC UTILITY COMPANY PARTICIPATION IN NUCLEAR POWER DEVELOPMENT
PLANTS UNDER CONSTRUCTION, DESIGN, OR CONTRACT NEGOTIATIONS, MARCH 15, 1959

Name of Organization and Plant (a)	*Type of Reactor*	*Capacity of Plant, Kw Electric*	*Location*	*Estimated Cost to Utility Organization*	*In Operation By*
(4) Commonwealth Edison Co.—Nuclear Power Group, Inc. (Dresden)	Boiling water	180,000	Near Joliet, Ill.	$51,000,000	1960
(5) Consolidated Edison Co. of N. Y., Inc. (Indian Point)	Pressurized water, thorium converter	275,000	Indian Point, N. Y.	100,000,000	1961
(6) Northern States Power Co.—Central Utilities Atomic Power Associates (Pathfinder)	Controlled recirculation, boiling water with internal nuclear superheater	66,000	Sioux Falls, S. D.	22,800,000	1962
(7) Pacific Gas & Electric Co. (Humboldt Bay)	Advanced boiling water	50,000 (*b*)	Eureka, Calif.	20,000,000	1962
(8) PRDC-Detroit Edison Co. (Enrico Fermi)	Fast breeder	100,000	Monroe, Mich.	78,000,000	1960
(9) Yankee Atomic Electric Co. (Yankee)	Pressurized water, stainless steel clad fuel elements	134,000	Rowe, Mass.	57,000,000	1960
(10) Carolinas Virginia Nuclear Power Associates (Parr Shoals)	Pressurized water, pressure tube, heavy water moderated	17,000	Parr, S. C.	28,000,000	1962
(11) East Central Nuclear Group Florida West Coast Nuclear Group	Gas cooled, heavy water moderated	50,000	Florida West Coast Area	34,898,000	1963
(12) Philadelphia Electric Co. High Temperature Reactor Development Associates, Inc.	High temperature, helium cooled, graphite moderated	30,000–40,000	Peach Bottom, Pa.	24,500,000 (*c*)	1963
(13) General Public Utilities Corp. System (Saxton)	Water type	5,000	Saxton, Pa.	8,250,000	1961 (*est.*)

(*a*) Utility company members of respective groups are shown in Table V.
(*b*) Guaranteed. 60,000 kw expected.
(*c*) Construction of plant is on a fixed price contract.

TABLE III—ELECTRIC UTILITY COMPANY PARTICIPATION IN NUCLEAR POWER DEVELOPMENT PROJECTS IN PLANNING STAGES, MARCH 15, 1959

Name of Organization	*Type of Reactor*	*Capacity of Plant, Kw Electric*	*Location*	*Estimated Cost to Utility Organization*	*In Operation By*
(14) New England Electric System	Not yet selected	Over 200,000	New England	—	Mid '60's
(15) Pacific Gas & Electric Co.	Not yet selected	200,000	California	—	—

TABLE IV—ESTIMATE OF EXPENDITURES BY ELECTRIC UTILITY COMPANIES FOR NUCLEAR POWER DEVELOPMENT (*a*) MARCH 15, 1959

	1955 and Earlier	*1956*	*1957*	*1958*	*1959*	*1960*
Expenditures for Plants (*b*)	$10,993,000	$25,361,000	$33,348,000	$50,112,000	$105,913,000	$89,076,000
Other Expenditures (*c*)	2,041,000	1,592,000	2,620,000	4,816,000	4,940,000	11,047,000
Total by Years	13,034,000	26,953,000	35,968,000	54,928,000	110,853,000	100,123,000
Cumulative	13,034,000	39,987,000	75,955,000	130,883,000	241,736,000	341,859,000

(*a*) Based on information obtained from the major nuclear power groups and previous surveys made by Edison Electric Institute.

(*b*) Estimate of expenditures by electric utility organizations for the following plants in operation, under construction or contract, including accompanying research and development work, but exclusive of operating costs.

Santa Susana, Shippingport, Vallecitos, Dresden, Indian Point, Pathfinder, Humboldt Bay, Enrico Fermi, Yankee, Parr Shoals

(*c*) Includes expenditures by individual companies and groups of companies for nuclear power study, research, and development. These figures do not include expenditures associated with any of the projects listed in (*b*) above. Included in this category are the following groups:

Atomic Power Development Associates
Atomic Power Engineering Group
East Central Nuclear Group
Florida West Coast Nuclear Group
High Temperature Reactor Development Associates
Nuclear Power Group
Pacific Northwest Power Co. Group
Pennsylvania Power & Light Co. Project (up to time of cancellation)
Pioneer Service & Engineering Group
Rocky Mountain-Pacific Nuclear Research Group
Southwest Atomic Energy Associates
Texas Atomic Energy Research Associates

with projects proposed by the AEC because the interest of industry should itself be a significant test of any reactor's competitive promise. Any reactor selected by industry will be tested against industry's standards of reliable and economic operation.

To date electric power companies have invested in nuclear power projects amounts substantially in excess of the equivalent costs of conventional plants for both AEC-proposed and unsolicited proposals, thus reducing the required expenditure of government funds.

The Future

What is the outlook for the year ahead in nuclear power development? The AEC has submitted to the Joint Committee a bill authorizing a program which calls for the construction by the government of four relatively small-scale reactors. One is an experimental, organic-cooled reactor to be constructed at a Commission installation. The second, an experimental, low-temperature, process-heat reactor, would also be built at a Commission site. The third proposed reactor is a boiling-water prototype, which, as an alternative to construction by the Commission, will be offered to private, public or cooperative power organizations for construction and ownership by the organization in a cooperative arrangement with the AEC. The AEC proposes, in addition to research and development assistance, to provide financial assistance toward capital costs not to exceed 50 percent of the capital cost of the plant.

The fourth, a proposed small-power reactor, as an alternative to Commission construction at an AEC site, may be built by the Commission under an arrangement with a cooperative or publicly owned organization. The arrangement proposed would be similar to those under which the Piqua, Ohio, Municipal plant, the Elk River, Mich., REA plant, and the Nebraska Consumers Public Power Project are being built, whereby the AEC would own the reactor and sell steam to the cooperative or publicly owned organization.

Provision is made in the proposed legislation both for research and development assistance for the HTRDA-Philadelphia Electric, gas-cooled reactor project, as well as funds for the construction of the government-owned and operated, gas-cooled reactor based on a design study authorized by the Congress and completed last year by Kaiser Engineers.

To provide research and development assistance in support of unsolicited proposals from the utility industry, there is proposed the sum of $5 million. In introducing the AEC-proposed bill in the U. S. Senate, Joint Committee Chairman Anderson stated that "we and some of our colleagues on the Committee have some serious reservations as to the adequacy of the program, projects and policies recommended." Reviewing the program, he stated that the Joint Committee will want to consider authorizing additional projects, including one or two experimental prototype reactors for construction by the AEC on their sites, also an organic-cooled prototype in the 50,000 to 100,000 kw electric size.

Assistance Considered

With respect to established reactor types, Chairman Anderson has said that consideration may be given to authorizing assistance for private construction of one or two reactors in the 75,000 to 150,000-kw electric size. Also, he said the Committee may wish to consider an additional plant of 20,000 to 60,000-kw electric for construction and ownership by the AEC in cooperation with a municipal organization or other public body.

The past year can be summarized as one in which our industry program in nuclear power development con-

TABLE V — ELECTRIC UTILITY COMPANY PARTICIPATION IN NUCLEAR POWER DEVELOPMENT.
NAMES OF ELECTRIC UTILITY COMPANIES PARTICIPATING IN NUCLEAR POWER. STUDY, RESEARCH, DEVELOPMENT OPERATING & CONSTRUCTION PROJECTS, MARCH 15, 1959.

Projects in Operation

1. Duquesne Light Co. (Shippingport)
2. Pacific Gas & Electric Co. (Vallecitos)
3. Southern California Edison Co. (Santa Susana)

Projects Under Construction, Design or Contract Negotiations

4. Commonwealth Edison Co.
   Nuclear Power Group
   American Electric Power Service Corp., Commonwealth Edison Co., Central Illinois Light Co., Illinois Power Co., Kansas City Power & Light Co., Pacific Gas & Electric Co., Union Electric Co.
5. Consolidated Edison Co. of N. Y., Inc.
6. Northern States Power Co.
   Central Utilities Atomic Power Associates
   Central Electric & Gas Co., Interstate Power Co., Iowa Power & Light Co., Iowa Southern Utilities Co., Madison Gas & Electric Co., Mississippi Valley Public Service Co., Northern States Power Co., Northwestern Public Service Co., Otter Tail Power Co., St. Joseph Light & Power Co., Wisconsin Public Service Corp.
7. Pacific Gas & Electric Co. (Humboldt Bay)
8. The Detroit Edison Co.
   Power Reactor Development Co.
   Alabama Power Co., Central Hudson Gas & Electric Corp., Cincinnati Gas & Electric Co., Columbus & Southern Ohio Electric Co., Consumers Power Co., Delaware Power & Light Co., Detroit Edison Co., Georgia Power Co., Gulf Power Co., Iowa-Illinois Gas & Electric Co., Long Island Lighting Co., Mississippi Power Co., Philadelphia Electric Co., Potomac Electric Power Co., Rochester Gas & Electric Corp., Toledo Edison Co., Wisconsin Electric Power Co.
9. Yankee Atomic Electric Co.
   Boston Edison Co., Cambridge Electric Light Co., Central Maine Power Co., Central Vermont Public Service Corp., Connecticut Light & Power Co., Hartford Electric Light Co., Montaup Electric Co., New Bedford Gas & Edison Light Co., New England Power Co., Public Service Co. of New Hampshire, Western Massachusetts Electric Co.
10. Carolinas Virginia Nuclear Power Associates
    Carolina Power & Light Co., Duke Power Co., South Carolina Electric & Gas Co., Virginia Electric & Power Co.
11. East Central Nuclear Group
    Florida West Coast Nuclear Group
    Appalachian Power Co., Cleveland Electric Illuminating Co., Columbus & Southern Ohio Electric Co., Dayton Power & Light Co., Indiana & Michigan Electric Co., Indianapolis Power & Light Co., Louisville Gas & Electric Co., Monongahela Power Co., Ohio Edison Co., Ohio Power Co., Pennsylvania Power Co., Potomac Edison Co., Southern Indiana Gas & Electric Co., West Penn Power Co., Florida Power Corp., Tampa Electric Co.
12. Philadelphia Electric Co.
    High Temperature Reactor Development Associates, Inc.
    Alabama Power Co., Arizona Public Service Co., Arkansas Power & Light Co., Atlantic City Electric Co., Baltimore Gas & Electric Co., California Electric Power Co., Central Illinois Electric & Gas Co., Central Illinois Light Co., Central Illinois Public Service Co., Central Louisiana Electric Co., Inc., Central Power & Light Co., Cincinnati Gas & Electric Co., Cleveland Electric Illuminating Co., Delaware Power & Light Co., Detroit Edison Co., Gulf Power Co., Gulf States Utilities Co., Hawaiian Electric Co., Ltd., Idaho Power Co., Illinois Power Co., Iowa Public Service Co., Kansas City Power & Light Co., Kansas Power & Light Co., Kentucky Utilities Co., Louisiana Power & Light Co., Mississippi Power Co., Mississippi Power & Light Co., Missouri Public Service Co., Montana Power Co., New Orleans Public Service, Inc., New York State Electric & Gas Corp., Niagara Mohawk Power Corp., Pacific Gas & Electric Co., Pacific Power & Light Co., Pennsylvania Power & Light Co., Philadelphia Electric Co., Portland General Electric Co., Public Service Co. of Colorado, Public Service Co. of New Mexico, Public Service Co. of Oklahoma, Public Service Electric & Gas Co., Puget Sound Power & Light Co., Rochester Gas & Electric Corp., St. Joseph Light & Power Co., San Diego Gas & Electric Co., Sierra Pacific Power Co., Southern California Edison Co., Southwestern Electric Power Co., United Illuminating Co., Utah Power & Light Co., Washington Water Power Co., West Texas Utilities Co.
13. General Public Utilities Corp. System

Projects in Planning Stages

14. New England Electric System
15. Pacific Gas & Electric Co.

Study, Research & Development Groups

16. Atomic Power Development Associates
    Alabama Power Co., Baltimore Gas & Electric Co., Central Hudson Gas & Electric Corp., Cincinnati Gas & Electric Co., Cleveland Electric Illuminating Co., Connecticut Light & Power Co., Consolidated Edison Co. of N. Y., Inc., Consumers Power Co., Delaware Power & Light Co., Detroit Edison Co., General Public Utilities Corp., Georgia Power Co., Gulf Power Co., Hartford Electric Light Co., Indianapolis Power & Light Co., Jersey Central Power & Light Co., Long Island Lighting Co., Metropolitan Edison Co., Mississippi Power Co., New Jersey Power & Light Co., New York State Electric & Gas Corp., Niagara Mohawk Power Corp., Pennsylvania Electric Co., Philadelphia Electric Co., Potomac Electric Power Co., Public Service Electric & Gas Co., Rochester Gas & Electric Corp., Toledo Edison Co., Wisconsin Electric Power Co., Wisconsin Power & Light Co.
17. Atomic Power Engineering Group
    Central Illinois Public Service Corp., Central Louisiana Electric Co., Central Power & Light Co., Interstate Power Co., Iowa-Illinois Gas & Electric Co., Kentucky Utilities Co., Lake Superior District Power Co., Northern Indiana Public Service Co., Public Service Co. of Indiana, Inc., Public Service Co. of Oklahoma, Southwestern Electric Power Co., West Texas Utilities Co.
18. East Central Nuclear Group (see item 11)
19. Minnesota Nuclear Operations Group
    Minnesota Power & Light Co., Northern States Power Co.
20. Nuclear Power Group (see item 4)
21. Pacific Northwest Power Co. Group
    Montana Power Co., Pacific Power & Light Co., Portland General Electric Co., Washington Water Power Co.
22. Puget Sound Utilities Council
    Puget Sound Power & Light Co.
23. Rocky Mt.-Pacific Nuclear Research Group
    Arizona Public Service Co., California Electric Power Co., Pacific Power & Light Co., Portland General Electric Co., Public Service Co. of Colorado, Public Service Co. of New Mexico, Utah Power & Light Co., Washington Water Power Co.
24. San Diego Gas & Electric Co.*
25. Southwest Atomic Energy Associates
    Arkansas Power & Light Co., Arkansas-Missouri Power Co., Central Louisiana Electric Co., Empire District Electric Co., Gulf States Utilities Co., Kansas Gas & Electric Co., Kansas Power & Light Co., Louisiana Power & Light Co., Mississippi Power & Light Co., Missouri Public Service Co., New Orleans Public Service Inc., Oklahoma Gas & Electric Co., Public Service Co. of Oklahoma, Southwestern Electric Power Co., Western Light & Telephone Co.
26. Texas Atomic Energy Research Foundation
    Central Power & Light Co., Community Public Service Co., Dallas Power & Light Co., El Paso Electric Co., Gulf States Utilities Co., Houston Lighting & Power Co., Southwestern Electric Power Co., Southwestern Public Service Co., Texas Electric Service Co., Texas Power & Light Co., West Texas Utilities Co.

* The study arrangement that San Diego Gas & Electric Co. has with General Atomic Division of General Dynamics Corp. will be discontinued if the HTRDA project, of which San Diego Gas & Electric Co. is a member, obtains Congressional and AEC approval.

tinued to show vigorous progress and further expansion. The panel report on the four large-scale projects dramatically points up progress in projects underway. New undertakings, such as the Philadelphia Electric-HTRDA advanced gas-cooled reactor is tangible evidence of further expansion of the program. Additional industry projects now under consideration may be expected to be undertaken in the year ahead.

The year saw further resolution of some of the difficult and complex problems involved in drafting long-range objectives mutually acceptable to the AEC and the Congress. There were repeated suggestions of broadening the forms of government financial assistance to our industry as well as growing emphasis on construction of small-scale and prototype reactors.

However, the importance has been lost sight of in government that any nuclear program which may be adopted must make maximum use of the cost-cutting incentives and initiative of industry as well as ownership of facilities by industry, if the program is to succeed in achieving the objectives at minimum cost and within the nation's normal business framework.

These basic fundamentals have become obscured because of the birth and early development of nuclear power in a cloud of secrecy and government monopoly. This beginning, however, should not dictate its ultimate development. For there is nothing special about nuclear power that requires its future development outside the framework of our free enterprise type of business system, notwithstanding the claims of advocates of public power and government monopoly who would have America believe this.

The sooner there is widespread recognition of the basic fundamentals in the case, the sooner the nation will reach the objectives it has set for itself.

Indian Point Nuclear Power Plant

By R. F. Brower
Vice President, Consolidated Edison Co. of New York, Inc.

HERE is a current status report on the Indian Point nuclear power project of Consolidated Edison Co. of New York, Inc. We are now around the corner on this job and moving toward a completion date in April, 1961.

Quickly, here is some of the history of Indian Point.

The project has its roots in the Atomic Energy Act of 1954. A few weeks after this Act was passed, we made various surveys at Indian Point to determine its suitability for an atomic energy plant. The site had been purchased a short time previously for a conventional generating station and although the exclusion area around the site was not all that might have been wished for, it appeared to us that the site would be suitable for a nuclear power plant if adequate containment precautions were taken.

Talks with manufacturers were launched and in the early part of 1955 we entered into a contract with Babcock and Wilcox Co. to design and build for us a nuclear steam generator, subject to Atomic Energy Commission approval of our plan. This initial contract was based upon the concept of a pressurized water converter reactor using fully enriched uranium metal as the fissionable material and thorium metal as the fertile material.

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 7, 1959.

Construction costs of the plant were then estimated at $55 million including research and development.

Shortly thereafter, we applied to the AEC for a construction permit and on May 4, 1955, the permit was issued by the AEC under the title, "Construction Permit—Power Reactor Number One."

The uranium-thorium cycle was an untried concept and much research and development on the fuel cycle chosen lay ahead. This research and development has now been completed and the results have had a considerable effect on design, time schedule and costs. Incorporation into the project of necessary redesigns, additional safety precautions, capacity enlargement, and especially the rising tide of inflation have now pushed the estimates for Indian Point to $100 million.

Our original policy decision was and continues to be that the plant would be financed completely by Consolidated Edison and that we would not ask for government assistance.

Indian Point is located in the northeast corner of our service area, about 35 miles from Times Square. Large-capacity, high-voltage interconnections between the Consolidated Edison and Niagara Mohawk Systems pass near the site and provide an adequate outlet for the capacity to be produced. Our service area now requires

Figure 1

3¾ million kilowatts. It is sometimes described as the greatest concentration of electric power in the world.

Indian Point was formerly an amusement park on the east bank of the Hudson River. The view is made looking up the river toward the Bear Mountain Bridge and Albany. (Figure 1.) The park which operated at the location of our Indian Point plant had fallen into disrepute as far as the local citizenry was concerned. They are delighted with the halt of the bacchanalian revels and the relief of their local tax problems which Indian Point will bring. The moth-ball fleet across the river is loaded with many thousands of tons of wheat. While nuclear radiations of sufficient intensity might be valuable in preserving this grain, we have not given very serious consideration to the idea of providing this service from Indian Point and the plant is not likely to contribute to either preservation or destruction of the wheat.

Internal Thorium Converter

The reactor is an internal thorium converter, cooled and moderated by light water under 1500 pounds per-square-inch pressure. The reactor core utilizes a homogeneous mixture of fully enriched uranium oxide and thorium oxide, formed into small pellets and incorporated into rod type fuel elements clad with stainless steel. The expected life of a core is two years when operated at full power at 80 percent plant factor.

At an early date, we decided to make Indian Point a hybrid plant—part nuclear and part conventional. Studies indicated economic and operating advantages of superheating the steam from the nuclear steam generator and this feature of the project has been retained since its inception. Two oil-fired superheaters, being built for us by Foster Wheeler, will increase the saturated steam from the nuclear steam generator to 1000°F, and as a result of this superheat, the plant capacity is increased from 163,000 kw to 275,000 kw.

The net over-all effect of the superheating cycle is a reduction in the over-all unit cost of the plant from $525 a kilowatt of capacity to $365 a kilowatt, and an increase in energy output at a very favorable incremental heat rate.

The turbine-generator and other plant components are similar to those of conventional fuel-fired plants.

The river front at Indian Point consists of a low rocky bluff which drops off sharply to the river. The plant itself is being located between the two piers which served as landing spots for the former amusement park.

We began clearing the site and building access roads in 1956 and this led to the first public complaint received by the company regarding the project. One of our contractors used a photograph of this work in a local advertisement, and Consolidated Edison received a vigorous protest from an individual residing 10 miles from the plant location. He pointed out that we were destroying housing of vital importance to the local bird population.

He asked what we intended to do about this wanton destruction.

With trees and topsoil out of the way, we began work on the rock ledge. The reactor and its containment were to be sunk to the midline in this rock and the excavation was a long and arduous process. In all, we had to remove some 345,000 cubic yards of track.

Location precluded the use of "Operation Plowshare" and we had to resort to what might now be referred to as old-fashioned explosives. While we blew up 221,710 pounds of dynamite, in modern terminology it should be noted that the total yield was only slightly over a tenth of a kiloton.

Rock and Concrete

Once we had taken out this rock, we turned around and began filling the hole in with concrete. By the end of March we had poured 50,000 cubic yards back into the cavity so painfully excavated, with another 30,000 cubic yards still scheduled to go into the job.

One unusual feature of Indian Point is the biological shield placed on the outside of the containment sphere. It is constructed of ordinary concrete 5.5 feet thick with a self-supported, trussed roof averaging three feet thick. The outside shield reduces the size of the sphere, simplifies thermal insulation of the sphere, and provides additional protection against external radiation to both the public and to personnel who will operate this and future adjacent units.

Since the steel containment sphere is 160 feet in diameter, the walls of the biological shield rise fairly spectacularly into the air even though so much of the work is below grade.

The biological shield side walls and foundation work inside the shield were completed in the fall of 1958. Work was then begun on the erection of the containment sphere. The pre-dished plates of the sphere were partly assembled and welded at the site and these sub-assemblies were swung into place using the steel mast in the center.

The sphere is now being completed and a pressure test will be made during the summer after which installation of equipment inside the sphere will be begun.

The mast will be used for placing the roof shield structure in place. Twenty-four, pre-cast, reinforced concrete ribs, each weighing 64 tons, will be keyed into the crow's nest type structure at the center, and the spaces between the ribs stacked with pre-cast concrete slabs. This roof structure, completely self-supported,

Figure 2

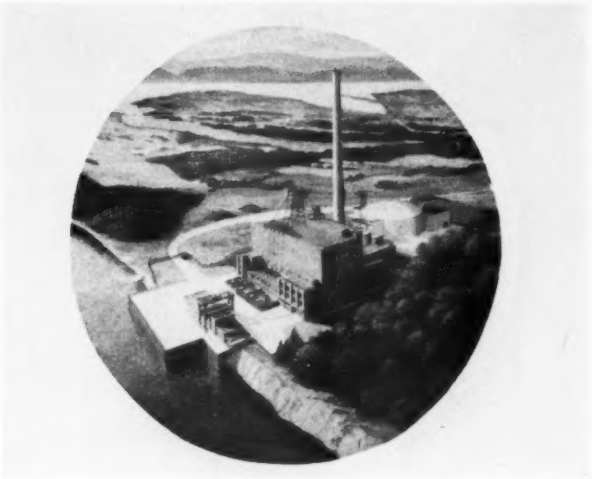

Figure 3

will have a weight in the vicinity of 7,000 tons.

A great deal of the fabrication is being done away from the site. Figure 2 shows Babcock and Wilcox forming a disc of seven-inch plate clad with stainless steel on one side into a hemisphere in order to form the bottom head of the pressure vessel which will provide primary containment for the reactor core.

In the Westinghouse shops at East Pittsburgh, turbine fabrication is well along and the generator field is being wound. Similar fabrication is under way by Ingersoll Rand which is providing the condensers; by Foster Wheeler which will erect the oil-fired superheaters and by many other suppliers of component parts for the finished plant.

On the home front, our information people, using demonstration materials are still covering the area with illustrated talks on the why's and how's of Indian Point. While they still present close to 200 lecture demonstrations a year on atomic energy, they report that public interest in the nucleus is being pushed into the background by modern space technology. "To be really interesting today," they tell me, "a speaker should be about to leave for Mars or Venus."

Figure 3 shows how the plant should look in early 1961 when we get the grass growing again in the construction area and put in some shrubbery to house those displaced birds.

Of the estimated $100 million cost of the plant, Consolidated Edison has actually spent $28 million at latest count. We estimate that about $10 million of the total will have gone for research and development work by the time this nuclear power plant is completed and is producing electric power.

The increases in capital costs which we have sustained in the current inflationary trend will result in even higher power costs. Our present estimates of these indicate a price of slightly over 14 mills per kilowatt-hour at 75 percent plant factor.

However, we feel that Indian Point will produce information on the economic and reliability of nuclear fuel for central station operation which will be well worth the premium involved in moving into atomic energy at such an early date.

Yankee Atomic Electric Company Project

By Roger J. Coe
Vice President, Yankee Atomic Electric Co.

YANKEE Atomic Electric Co. was formed by a group of New England utility systems in 1954 expressly to undertake construction and operation of a jointly owned nuclear power plant. Figure 1 lists the companies that are participating and the percentages in which each company will subscribe to the common stock. The sponsoring utility companies will be the only stockholders of

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 7, 1959

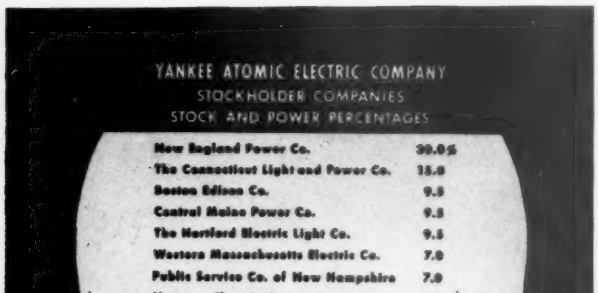
YANKEE ATOMIC ELECTRIC COMPANY
STOCKHOLDER COMPANIES
STOCK AND POWER PERCENTAGES
New England Power Co. 30.0%
The Connecticut Light and Power Co. 15.0
Boston Edison Co. 9.5
Central Maine Power Co. 9.5
The Hartford Electric Light Co. 9.5
Western Massachusetts Electric Co. 7.0
Public Service Co. of New Hampshire 7.0
Montaup Electric Co. 4.5
New Bedford Gas and Edison Light Co. 2.5
Cambridge Electric Light Co. 2.0
Central Vermont Public Service Corp. 3.5
100.0%

Figure 1

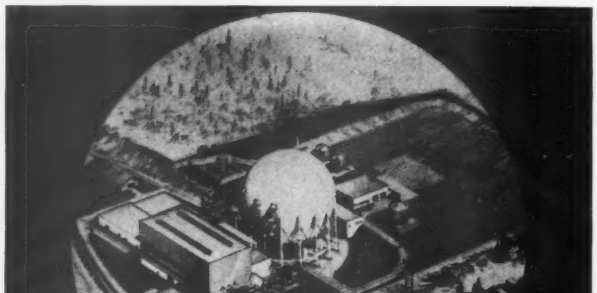

Figure 2

the Yankee Atomic Electric Co., and the entire electrical output of the plant will be sold to them in the same proportion as they contribute to the financing. Power will be delivered to each company over the existing transmission network plus some new construction.

Pressurized Water Reactor Selected

In mid-1955 a reactor of the pressurized water type was decided upon and the site at Rowe, Mass., in the northwestern corner of the state, was selected.

The Yankee reactor is similar in many respects to the one at Shippingport. The design developed for Yankee takes full account of the experience gained in the construction and initial operation of the Shippingport project, and at the same time attempts to move in the direction of a more nearly commercialized plant. The nominal rating of the plant is significantly higher than Shippingport and the core represents a departure from previously used designs. Slightly enriched uranium dioxide in the form of sintered pellets is used for all fuel elements and the cladding material is stainless steel. There are further differences in plant layout and design philosophy. The nominal net electrical capacity of the plant is 134,000 kilowatts.

A research and development program supported by AEC funds under the Power Reactor Demonstration Program to the extent of $5 million has been underway since early 1956 with Westinghouse as the sub-contractor. The work is now about 90 percent complete. The core design has been frozen and withdrawals of 3.4 percent enriched uranium from AEC are scheduled to start on May 1 of this year. Core fabrication will start soon thereafter.

Engineering Work Almost Complete

Engineering design of the Yankee plant is the responsibility of Westinghouse Electric Corp. and Stone & Webster Engineering Corp. as joint contractors, and Stone & Webster is handling the construction. Westinghouse is supplying the nuclear steam generator and all conventional components for the steam electric plant which it customarily manufactures. Engineering work began in July, 1956, and is now well along toward completion. As of April 1, expenditures and commitments totaled some $31 million of which amount $13 million has been actually expended.

Construction began in November, 1957, shortly after issuance of the AEC construction permit and continued through the winter with such operations as rough grading, construction of the field office and improvement of access highways and railroads.

Building Pace Stepped Up

With the coming of good weather last spring the pace of construction was stepped up and has continued throughout the year. The turbine building is now completed and closed in. The office building and service building are nearing completion and concrete work for the reactor plant structure was essentially completed last November.

Erection of the 125-foot diameter steel sphere which encloses the reactor and primary plant continued throughout the winter. It is now well along, about 60 percent complete, and is scheduled for completion on June 1, with testing operations scheduled for the month of June. Major items of plant equipment are scheduled for delivery and installation in the summer and fall months of this year. Testing of plant systems is scheduled for the early months of 1960, and it is hoped that the plant will have gone critical and power operation will be achieved by the end of 1960.

Capital Requirements $57 Million

Capital requirements are estimated at $57 million; this includes the cost of the plant itself, allowances for contingencies and escalation, interest during construction, the cost of fabricating the initial core, and an allowance for working capital.

Yankee's utility owners will provide $20 million through purchases of the company's capital stock. The remaining $37 million needed for the project will be

supplied by the sale of $20 million first mortgage bonds to a group of 10 life insurance companies headed by The Equitable Life Assurance Society and the purchase of $17 million in unsecured notes by a group of commercial banks in New England and New York City, headed by the First National Bank of Boston.

Financing Plan Approved

Negotiations have been completed and approval of the financing plan has been granted by the Massachusetts Department of Public Utilities. Hearings before the Securities Exchange Commission have been completed and an order is expected shortly. A hearing before the AEC on the company's financial responsibility was scheduled for April 9, in Washington.

We are estimating power costs in the range of 12 to 14 mills per kilowatt-hour—not during the first few years of operation when we are sure that power costs will be high—but later on in the mid-1960's when the plant should be operating reliably on a long-hour basis. These estimated power costs were arrived at on what we think is a conservative basis, and we have some hope of doing better. The cost of power from conventional steam plants in our area is expected to be about 9 to 10 mills by that time.

Figure 2 shows an artist's conception of the completed plant. In the left foreground are shown the turbine building, office building and control bay with the service building and permanent storehouse just beyond. At the right is the 125-foot steel sphere, located entirely above grade, which encloses the reactor plant.

Location of Reactor

Yankee Atomic's reactor itself is located at the lower center of the sphere, with the four primary loops, pumps and steam generators arranged radially around it. The inner concrete structure provides a support for the various components, acts as a missile shield and also supports the 150-ton polar crane.

Dresden Nuclear Power Station

By T. G. LeClair
Manager of Research and Development, Commonwealth Edison Co.

WORK on the Dresden Nuclear Power Station project is now about 75 percent completed.

The target schedule contemplates that the bulk of the fuel-loading and start-up tests will be completed before the end of 1959. It is expected that the plant will be in regular operation by the middle of 1960, or about six months ahead of the contract completion date of Dec. 7, 1960.

Located Near Chicago

The plant, which will have a net electrical capacity of 180,000 kilowatts, is being built on a 950-acre site on the Illinois waterway 50 miles southwest of Chicago, eight miles east of Morris, Ill.

Its circulating water is taken from the Kankakee River and discharged into the Illinois River. The plant's output will feed into the Commonwealth Edison Co. system which serves Chicago and Northern Illinois.

Dresden's nuclear power reactor is the largest under construction in the country. The station will be the first full-scale, privately-financed atomic power plant to go into operation in the United States.

General Electric Co., which designed the Dresden boiling-water reactor project, is building the plant for a contract price of $45 million. (Figure 1.) The plant will be owned and operated by Commonwealth Edison. Bechtel Corp. is the engineer-constructor.

Of the $45 million contract price, $15 million is being paid as a research and development expense over a period of five years by the co-sponsoring Nuclear Power Group, Inc. The eight companies comprising NPG are American Electric Power Co., Bechtel Corp., Central Illinois Light Co., Commonwealth Edison Co., Illinois Power Co., Kansas City Power & Light Co., Pacific Gas and Electric Co. and Union Electric Co.

Commonwealth Edison Pays $30 Million

The balance of $30 million is being paid by Commonwealth Edison, which will capitalize this amount plus something over $6 million in site and overhead costs.

The outstanding structural feature of Dresden is the 190-foot steel sphere which will house the reactor as-

Excerpts from an address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 7, 1959.

Figure 1

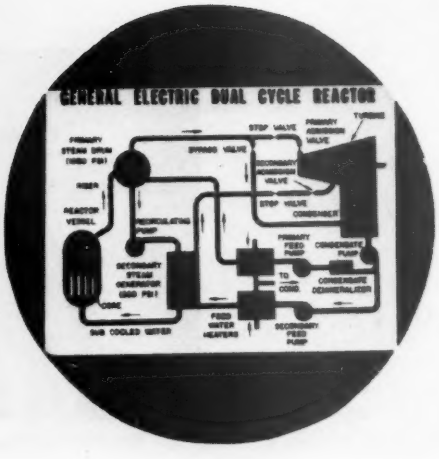

Figure 2

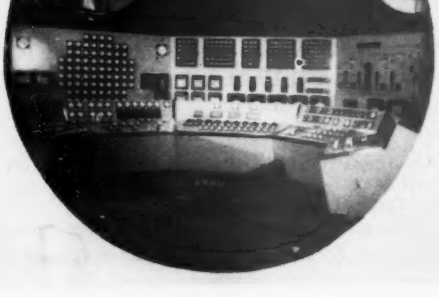

Figure 3

sembly. The containment sphere was completed and tested a year ago.

The 300-ton reactor pressure vessel has been set in place inside the sphere. Its piping connections are being made and the control rod mechanisms are being installed.

Approximately one-half of the nuclear fuel has been delivered to Dresden from the General Electric Atomic Products Department in San Jose, Calif. The fuel assemblies are being stored in a vault to await initial loading of the reactor this fall.

The Dresden dual-cycle, boiling-water reactor, developed by General Electric, is a modification of the simple boiling reactor. The latter uses steam created directly in the reactor. The dual cycle reactor does also, but, in addition, this system has another cycle in which hot water from the steam drum, on its way back to the reactor, passes through secondary generators to create more steam. (Figure 2.)

Training of station operating personnel has been under way since 1957 in classrooms at special schools and with actual reactor operation at Argonne Laboratory and at Vallecitos, Calif. Men are beginning to be familiar with the Dresden control board which already is in place. The consoles control the reactor, steam valves and generator. The vertical panels contain recording instruments for reactor operation and control rod position indicators. In the center of the control board are annunciators and on the right side is a miniature flow diagram. (Figure 3.)

102 Personnel

The operating organization, patterned after Commonwealth Edison's newest stations, will have a total of 102 personnel. Thirty-five employees, including the superintendent and assistant, already are on the job.

The heart of the plant is the reactor core contained in the reactor vessel which has an inside diameter of 12 feet by 42 feet high with a 5⅜-inch wall thickness. Eighty control rods of boron and stainless steel are 9½ feet long and will control the reactor operation from start up to shut down. The core requires 488 fuel bundles, each of which is about 10 feet tall without the grappling fixture, is about four inches square and weighs about 375 pounds. Each bundle consists of 36 hollow zirconium rods containing slightly enriched uranium dioxide fuel pellets about one-half inch in diameter by five-eights of an inch long. Nearly half of the 488 bundles are stored in the fuel storage vault and represents an investment of about $6.8 million.

Spent fuel bundles, after removal from the reactor, are stored under water during the cool-off period in a 45-foot-deep storage pool in the fuel building.

The 300-ton reactor vessel is now installed and is being connected to the piping system.

In the turbine room the 1,800-rpm, dual-admission, tandem-compound, double-flow turbine is being installed. The generator is 245,000 kva, 85 percent power factor. The net plant heat rate is expected to be 11,880 Btu per kilowatt-hour with thermal efficiency of about 29 percent.

The radioactive waste building contains an elaborate waste disposal system which will collect liquid and solid wastes for treatment and subsequent disposal or storage. The system will prevent the release of any radioactive substance beyond the tolerance limits set by the AEC.

Commonwealth Edison considers Dresden a big step forward in nuclear power. However, the company hopes it will become the "Model T" of the boiling water reactor system. The experience gained from this full-scale plant should be the basis for improvements in capital costs, operating costs, and operating efficiencies to be incorporated in succeeding plants.

These advances lie in such areas as: superheating to improve thermal efficiency and increased power density to get more power output from a smaller reactor core. It should also be possible to simplify plant design, reduce containment cost and increase plant size to reduce unit investment. Fuel performance should be improved to reduce production cost.

With Dresden so near completion, this can be expected from its construction:

- It is the first full-scale boiling water reactor plant, 36 times as large as its models. Its nuclear reactor—heart of the plant—is the largest under construction in the United States.
- It is intended to prove that a full-scale plant will operate satisfactorily, leaving to later additions the necessary simplifications and cost reductions to attain economic nuclear power.
- Dresden already has stimulated construction of other boiling reactor plants which will be more efficient because of the lessons learned at Dresden.
- Some of the associates in Nuclear Power Group have had the courage to become associated with other projects without waiting for the completion of Dresden.

Progress at the Enrico Fermi Atomic Power Plant

By H. A. Wagner

Manager, System Development, The Detroit Edison Co.

THE Enrico Fermi Atomic Power Plant, being constructed at Lagoona Beach, Monroe County, Mich., is part of the nation-wide private industry participation in the Atomic Energy Commission's Power Reactor Demonstration Program.

The reactor plant is being designed by Atomic Power Development Associates, Inc., a non-profit corporation of 42 member companies. The nuclear facilities of this plant will be built, owned and operated by Power Reactor Development Co., a non-profit corporation supported by 25 member companies. The conventional steam turbine-generator facilities, which will utilize steam produced by the reactor, will be built, owned and operated by The Detroit Edison Co. Commonwealth Associates, Inc., is the architect-engineer for the nuclear portion of the plant, and United Engineers & Constructors, Inc., is construction engineer for both PDRC and Detroit Edison.

The plant site consists of 915 acres, about 30 miles southeast of Detroit, with the shore of Lake Erie as its eastern boundary. The plant area proper, 15 acres approximately, consists of the reactor site—eight acres, and the turbine-electric plant—seven acres. The Detroit Edison Co. owns the entire property and has leased the reactor site to PRDC. (Figure 1.)

The total power plant, when completed in August, 1960, will have the appearance shown in the artist's conception in Figure 2. The reactor containment capsule is complete, having received final air pressure and leak rate tests last December. A two-story building, adjacent to the rail spur, is the sodium clean-up and storage building, now 90 percent complete, and a one-story building in front of the reactor containment building is the gas clean-up building which has not yet been started. The conventional water tower, completed, is required to provide potable water storage and condensate storage. The office building, also completed and partially occupied, is adjacent to the control building, which is under construction. Behind the control building is the steam-generator building, also under construction, and the highest building is the heater bay which houses the de-aerating heater at the required operating elevation. Steel for the turbine house is 75 percent erected.

300 Megawatts of Heat

Initially, 300 megawatts of heat will be generated in the combined reactor core and blanket and conveyed by liquid sodium to the intermediate heat exchangers at a temperature of 800° F. The primary sodium pump will return the liquid sodium at 550° F to the reactor. There will be three such sodium loops attached to the reactor. Heat is taken from the intermediate heat exchanger by secondary sodium at 750° F and conveyed to the once-through type steam-generator. Liquid sodium at 500° F is returned to the intermediate heat exchanger by the secondary sodium pumps. There are three such steam-

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Figure 1

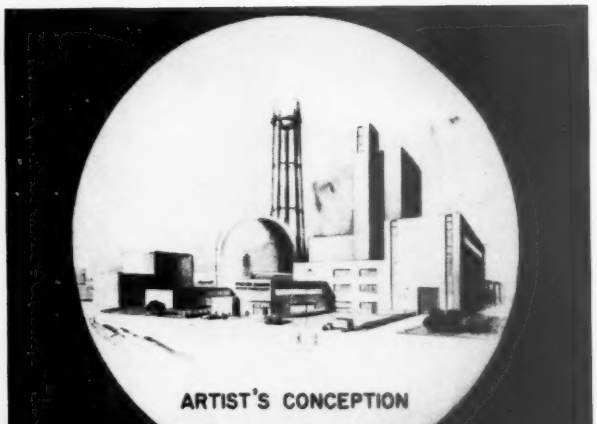

Figure 2

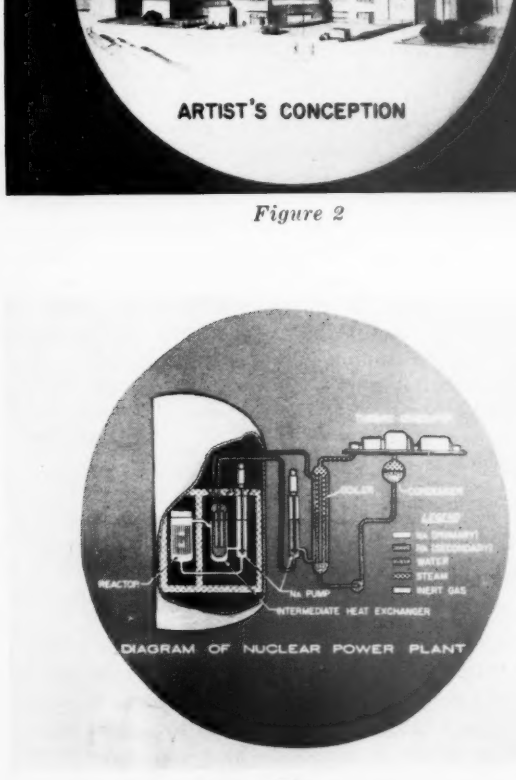

Figure 3

generator, or secondary sodium, loops. Steam at a pressure of 585 psig and 740° F from the steam-generator will produce 100 mw of electric power in the 1800 rpm condensing turbine-generator. (Figure 3.)

It is expected that the reactor will produce 430 mw of heat and the turbine-generator 150 mw of electric power. The capsule-like containment building is 72 feet in diameter and 120 feet in height. The reactor vessel, suspended inside the containment shell, was placed in its final position in October, 1958, and work internal to the vessel is proceeding on schedule. Installation of equipment within the reactor vessel will be completed by June of this year in time for the non-nuclear tests. The reactor vessel, which weighed 92 tons when initially placed in position, is fabricated from Type 304 stainless steel with wall thicknesses varying from 1⅛ inches to 2 inches. It is approximately 36 feet from bottom to top and about 14 feet in diameter at its widest part. When complete with internal shielding and rotating plug, the vessel weight will be about 350 tons.

The intermediate heat exchanger shell, one of three now installed in the containment capsule, is of the counter-flow, shell-and-tube type with primary sodium on the shell side and secondary sodium on the tube side. The units are designed so that the tube bundles may be removed without removing any sodium or piping and without draining the primary sodium system. The shell, tube sheet and tube material are Type 304 stainless steel.

Primary Sodium Pump

The primary sodium pump has a capacity of 11,800 gpm of sodium and develops a head of 310 feet. It is a mechanical type pump, similar in design to the conventional power plant condensate pump. The pump shield plugs, shaft, impeller and casing are designed as a complete assembly which can be removed from the pump tank without draining the primary sodium system. The pump tanks are now installed in the containment capsule. The internal assembly for one pump was shipped recently. Those for the other two pumps will be shipped before the end of this year. The primary sodium pump tanks and intermediate heat exchanger shells are in place. Work is progressing on the installation of the sodium piping and valves for the three primary loops, one of which will be used in the non-nuclear tests to begin in June of this year. All three loops, with secondary containment, should be completed prior to the non-nuclear testing.

An equipment decay tank is to be used for the purpose of storage, prior to maintenance operations, of radioactive equipment such as rotating plug, the primary sodium pump and IHX tube bundles.

Fuel and blanket subassemblies are loaded and withdrawn from the reactor by an offset handling mechanism. The unit has undergone tests in the fabricator's plant. The tests have since been completed and the unit is now at the plant site awaiting installation, about May 15, in the reactor vessel and plug.

Erection within the reactor vessel requires a degree of cleanliness beyond that normally needed in the erection of conventional power plant mechanical and elec-

(*Continued on page* 195)

Designing Systems for the Future

By Lewis R. Gaty
Vice President, Philadelphia Electric Co.

THE electric utility industry has had an exciting history since World War II. At the close of the war there were many eminent forecasters who foresaw a period of surplus capacity and stagnation before a new period of dynamic growth would begin. Instead, the load increased more steeply than before and has been continuing a strong growth trend ever since. An examination of the growth curve shows a definite change of the slope in 1946, then additional changes with an increasing rate of growth.

There seems to be a good basis for believing another increase in the rate of growth is already under way. There are a number of compelling reasons for this belief, among them those that have been already publicized, such as population growth, new family formations, greater use per domestic customer, and the air conditioning and high intensity lighting of commercial establishments. However, one of the most compelling is shown in Figure 1 illustrating the kilowatt-hours that can be purchased with one man-hour of industrial labor on the average. This shows that in 1932 the cost of one man-hour of labor was equivalent to the cost of approximately 35 kilowatt-hours, whereas in 1955 it was more than 250 kwhr. The kilowatt-hour is becoming a more versatile and valuable servant as new uses and devices are developing, and at the same time is becoming a greater bargain in terms of the cost of industrial manpower. This is indeed an exhilarating and challenging picture. Many use a figure of doubling every 10 years, but I am convinced this is too conservative and that our load will grow at an even faster rate.

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 8, 1959.

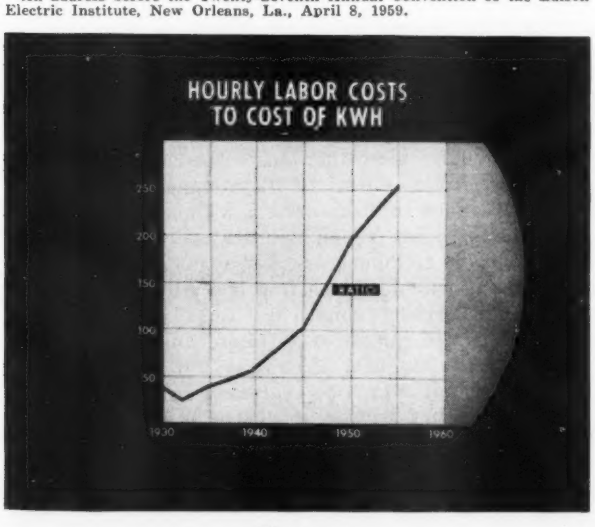

Figure 1

From Muscles to Electricity

For centuries unnumbered, man had to depend on animal muscles to do his work. Then, very slowly, power from windmills and falling water became available. Towns were located and cities grew and flourished where power was accessible. Eventually the use of power produced from fossil fuels came into use. First, steam power was used to drive shafts and belts. Then, nearly 80 years ago, man harnessed electricity generated by fossil fuel or by falling water. As this new genie grew and thrived, it was used to relieve mankind of many dreary tasks, at first slowly, then at an accelerating pace. New tasks were found daily in home, office, and factory that could be done better by electricity. Here, indeed, was the ideal form of energy to do man's bidding and to perform tasks far beyond the dreams of the visionaries.

Now we are entering a new era, the most fantastic and exciting of all time. There need be no ceiling on the growth of energy use but man's ingenuity and ability to find new ways for electric energy to multiply his productivity and provide for his comfort and well-being. It would be interesting to expand on this aspect, but my assignment is to review some of the problem areas facing us and some of the tools to use in meeting our obligations.

My definition of obligation is simply stated—the responsibility to supply the prodigious appetite for ever greater quantities of energy when and where wanted, with increasing service reliability, and at reasonable rates. This must be done in such a way that our facilities are unobtrusive and in keeping with community requirements.

I shall limit my discussion to only a few of the problem areas in the field of generation, transmission, distribution and utilization. These problem areas have been

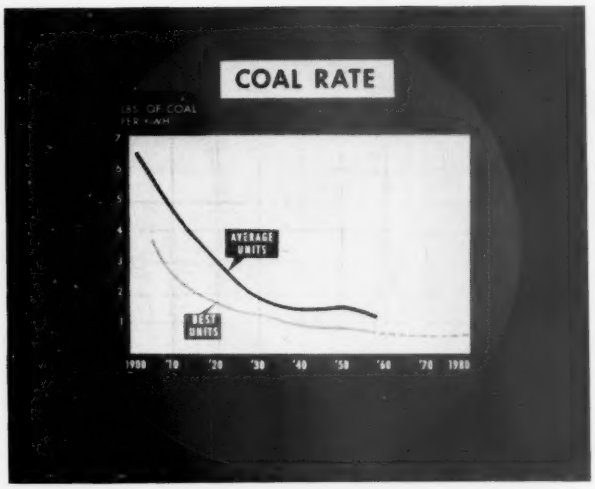

Figure 2

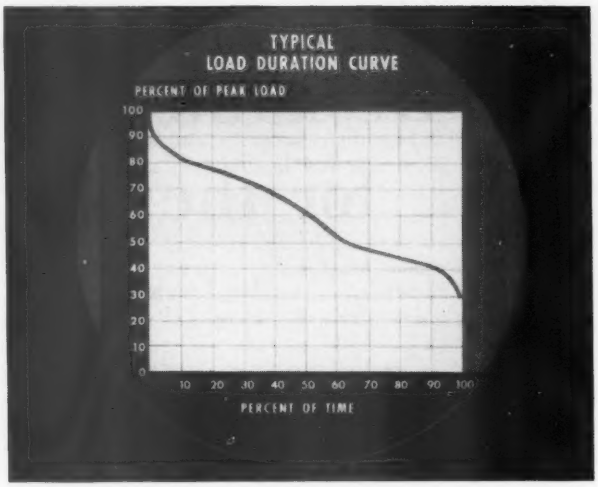

Figure 3

placed in four classifications, although each is related to the others. They are capacity, acceptability, reliability, and economy. The first letter of each word spells CARE, which is a good summary of the developments ahead.

Capacity must be provided through detailed advance planning many years in advance of requirements. This planning must include the amount of the load growth and the location of the most rapid growth, the location and size of new generating capacity and the transmission required to integrate it into the system. In order to realize the greatest economy in both installed cost and operating cost, the capacity of individual units of generation has been steadily increasing. (Figure 2.)

This has reduced the over-all cost of generation as the development program of the manufacturer and utilities in going to higher steam temperatures and pressures resulted in greater efficiency. Outstanding progress has been made through the installation of larger-size units operating at higher steam pressures.

Continued improvement is expected, although it becomes increasingly difficult as the theoretical limit of efficiency is approached. There are still economies to be realized by some of the systems through this means as well as through interconnection with adjacent systems.

What are the advantages of pooling capacity and energy by two or more systems? These benefits are in the form of substantial capital investment savings, operating savings and improved reliability. Many utility systems are interconnected with coordinated dispatching, and have already enjoyed the major benefits of such interconnection.

Experience has shown that the proper scheduling of capacity and energy between interconnected systems makes possible savings in daily operation that would not be realized in any other way. This has resulted in the growth and expansion of interconnections throughout the country until there are few areas remaining that have no interconnected systems. The savings that result from economy interchange between two systems are due to the ability to carry the load on the most efficient equipment. Even though the net flow at the end of the year may be zero, there can be interchange energy of as much as 7 percent of the total output of the two systems with savings in excess of one-half mill per kilowatt-hour on this interchange.

There are still some systems that have possibilities for interconnection with adjacent systems combined with integrated operation. One obvious benefit is the sharing of diversity. Savings in both fixed charges and operating expense result from diversity savings as well as substantial savings from reserve diversity. Integrated systems with adequate tie-line capacity make possible capital savings since each system can install larger turbo-generator units than it could justify as an isolated system. A reasonable amount of reserve capacity is the largest unit plus 4 percent of the load. An interconnection of two or more systems will often result in adequate reserve for all partners with one less unit installed on the combined systems.

Many systems are becoming so large and complex that automatic load control is necessary for their efficient operation. Economies result through closer adherence to increment cost loading of turbo-generators, but in addition the capability of the automatic dispatching and computing device is greatly in excess of a single manual dispatch office. The larger systems under manual control may require more than one dispatching office, with consequent delays. Automatic dispatching equipment can handle the most complex system with a response time much faster than under manual control. Necessary equipment and technique are now available for complete automatic dispatching, including operation under predetermined emergency conditions. Such equipment will provide accurate records of all interchange transactions, and will accelerate final accounting.

One item that cannot be evaluated on a basis of tangible savings, but may be invaluable, is the extra reliability that results under emergency conditions. There are unusual cases where load has continued to be carried due entirely to an interconnection when a long and costly outage would have resulted had the interconnection not been available.

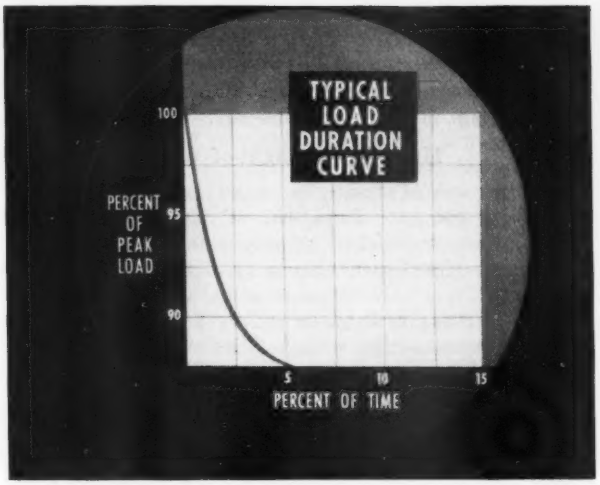

Figure 4

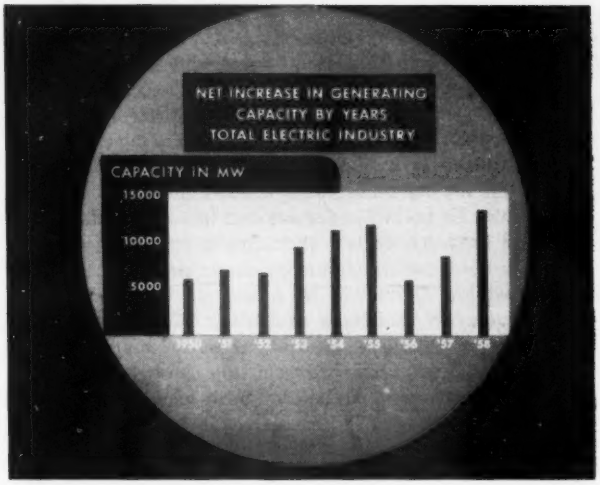

Figure 5

Another interesting tool available to us, which is just beginning to be recognized, is decentralized "peak shaving" through the use of packaged type, unattended diesel generator sets, or gas turbine-driven generators located on the transmission system, feeding directly into selected areas. A look at the load duration curve shown in Figures 3, 4 will reveal why large savings are possible.

Ten percent of our capacity is required to operate less than 2 percent of the time. If new capacity can be installed at low capital cost to supply this portion of the load, the fuel cost is of little importance because of the short operating time. In addition, benefits are obtained through savings of transmission losses, bulk power transmission and generating station investment and in improved area reliability.

Comprehensive studies of our system have shown that an installed first cost differential of $50 per kilowatt is required to show sufficient savings to make peak-shaving attractive, with anticipated price levels, load factors and rates of load growth. This differential may be attained with peak-shaving equipment now available.

As the future unfolds, increases in efficiency of new steam units will be less marked than they have been in the past. Systems will be composed of many machines with little difference in their efficiencies. Therefore, unless peak-shaving capacity is provided periodically, relatively efficient machines will move rapidly from base load operation into the peaking portion of the load curve, where the cost of obtaining high efficiency is not justifiable.

Large Savings Indicated

An analysis made for the Philadelphia Electric Co. system shows a possibility of large savings in annual costs for an extensive use of this type of equipment as a supplement to providing base load capacity. One of these diesel generator installations has been purchased and installed on an experimental basis to get actual operating experience.

One operation that requires intensive research and development is the complete automatic control of large unit boiler-turbo-generator systems, including all operations and checks necessary on start-up and shut-down. The ultimate would be to have the operator initiate the starting operation, after which all operations would be handled automatically until the generator was carrying load under the control of the automatic dispatching equipment. Present large generating stations are becoming so complex that it is extremely difficult for the operator to obtain all essential information in an emergency, analyze the situation and take the corrective steps required. Complete automation can provide the necessary speed and intelligence required to safeguard this equipment.

Before leaving the generating station part of the problem, (Figure 5), there is a difficult situation facing the industry which will not only increase capital costs, but may result in a dislocation of scheduled capacity additions needed within the next five years. (Figure 6.) This is the cyclic variation in orders for heavy equipment, transformers, boilers and turbo-generators. A look at the records will show a peculiar and unexplained variation of orders placed. This variation results in inefficient utilization of manufacturing facilities, but

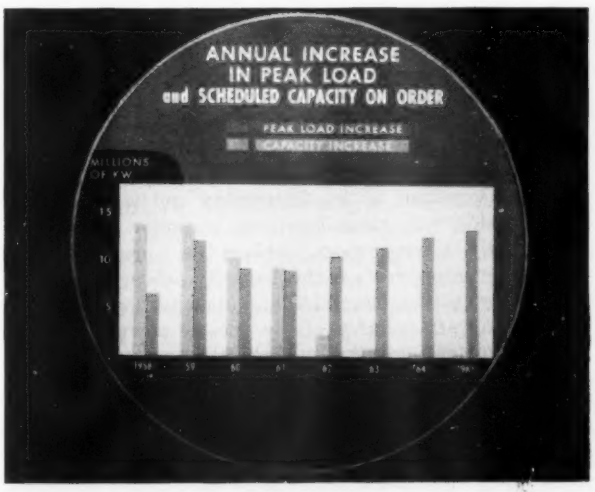

Figure 6

even more serious, a large variation in work forces. This is a costly problem, costly to the manufacturer in idle shop time and dislocated engineering and shop labor schedules, and costly to the customer in delays and construction schedule rearrangements that are an inevitable result of overloaded manufacturing facilities. The manufacturers will be hard pressed to provide the 15 million kw of boiler and turbo-generator capacity that should be installed for service in each of the years 1963 and 1964. There is a shortage of competent skilled labor for field installation even under present construction schedules. This will be a serious bottleneck with annual capacity additions exceeding 15 million kw.

What can be done to alleviate this? Various possibilities present themselves for consideration. Two utility companies have ordered boilers built and delivered, to be placed in storage. Estimates made by them and the boiler manufacturers show that the normal annual price increase, which will be avoided, will pay the storage costs. In addition, there is an estimated 10 percent saving in the erection cost as a result of having all parts available at the time of erection. A further advantage is the avoidance of costly delays in the service date because of late deliveries.

Advance Orders Create Savings

Possible savings on turbo-generators and improvement in shop schedules may be realized and ultimate delivery dates improved by placing advance orders for critical components. The machine size and steam conditions must be specified and a firm order placed for future delivery. The contract could provide for price based on the date of completion of component fabrication. The necessary design and engineering work could be completed to provide the necessary information to the purchaser and to facilitate early ordering of material. Orders could be placed for long delivery items. One such item is the rotor forging, which could be ordered, tested, fully machined, then put in storage. Resultant savings should offset the cost of storage and assure completion on schedule. A careful analysis of such items could result in major savings and substantial improvements in shop labor schedules, and in over-all delivery periods. A method of overcoming the present wide swings in orders and deliveries will be a major factor in our effort to provide additional capacity at minimum cost. The economics of load factor improvement is just as important to the manufacturer as to the utility.

New sites for generating stations and major substations will become an increasingly difficult problem in the next decade, particularly for those companies serving large metropolitan areas. Increasing public resistance is now evident in some locations, a factor which will undoubtedly become more serious as time goes on. Greater development of the capacity of present sites must be accepted as essential, and stations having multi-million kilowatt capacity are to become more common.

Outgoing transmission line capacity becomes a key to such development. Hand-in-hand goes the problem of right-of-way for overhead transmission lines. They are actively resisted in built-up sections, and land is becoming scarce and therefore prohibitive in cost or non-existent. The acreage required by a number of high-voltage aerial lines radiating from a major generating station or substations gives pause for thought. A right-of-way one hundred feet wide requires 13 acres per mile. As land values continue to climb and new routes become unavailable it will be necessary to revise our thinking on such rights-of-way.

Multiple-Use Right-of-Way

Multiple use of right-of-way by transmission lines and oil or gas pipe lines, use of multi-circuit tower lines, and construction of transmission lines along railroad rights-of-way are among possible methods to be considered. In certain locations in heavily built-up areas it may be necessary to go to underground construction, yet for the extra-high voltage lines needed for future bulk transmission there is presently no satisfactory underground system available for high-capacity, long-distance transmission.

This cable insulation problem is being actively investigated now under joint sponsorship of the industry and the manufacturers. It may be that an insulation will be developed that is satisfactory for cables operating at 460 kv or 600 kv.

As an alternate to this, there is a possibility that high-voltage direct current will provide an answer. It is now practical to use direct current at 600 kv to 1000 kv. The terminal equipment for conversion and inversion is so expensive that it is economical only for large blocks of power over long distances. However, it does have a number of attractive advantages that may be a major factor in special applications. Most of the development work has been done in Europe. The practicality has been proved by a number of operating installations and it is now a question of improvement and cost reduction.

Major transmission substations adjacent to metropolitan areas are increasingly difficult to locate. Land is scarce because of active programs of residential and commercial construction. In some locations there is a need for considerable set-backs from property lines, extensive landscaping, and control of noise level of transformers. At the same time, greater area is required to provide for more lines, additional capacity, and higher voltage requiring wider phase spacing.

During the early years of growth of the industry the transmission and distribution line wire size was frequently determined by mechanical strength to meet assumed loading conditions imposed by temperature, wind, and ice. This provided substantial additional unused electrical capacity. In recent years this excess capacity has provided a welcome margin for load growth. Much of it has been used to supply our growing loads and it is now necessary to replace many of the conductors for load reasons. A review should be made of the existing design criteria to determine how much the mechanical strength should be increased to improve service reliability. An increase in the minimum design strength will provide additional insurance against the damage and failure due to wind and sleet. At the same time, it will provide an additional margin for future load growth at a low increment cost. Minimum standards should be established for new construction and for all facilities replaced for capacity reinforcement. The entire distribution system and transmission system should be reviewed.

An important factor to consider here is that if, in the case of a major area outage, the amount of trouble

can be cut in half, the cost of restoration and the duration of customer outages can be reduced to substantially less than half. This comes about through two factors. First, outside help brought in for emergency restoration will be unfamiliar with the territory and construction standards and therefore will work at a much slower rate than your own employees. Secondly, the efficiency of the dispatching organization and the supervision will be more nearly normal under the reduced amount of trouble instead of drastically reduced because of long hours under high stress and the added burden of a large and strange work force.

Some benefits will also be obtained in lower voltage drop and voltage flicker. The resistance component can be reduced and, by the use of capacitors along the lines, the reactance component can be controlled so that the combination of these two will provide a considerable improvement in both voltage regulation and flicker. Both of these will require greater attention with the higher customer loads and their consciousness of service abnormalities.

It is increasingly evident that more time and effort must be devoted to community relations in parallel with the expansion of our systems. The maintenance of our existing facilities and the installation of new facilities require that more careful consideration be given to our community relations as population density increases.

Along the highways a method must be found to provide improved appearance. Many of the highway systems now being built or planned have both physical and legislative barriers to a continuation of present methods of utility service installations. A multiple circuit pole line with services across the new super highways, as well as to near-side residences, will be less tolerable. Two pole lines, one on each side, are not a good answer. Rear property lines provide a solution under some conditions but are not a panacea. There has been a considerable amount of work done to develop a satisfactory system using either combination underground-overhead, or all underground facilities, but the economic penalties are high. A number of solutions may ultimately be worked out, depending on the local conditions, but they must meet the needs and interests of all.

High Intensity Lighting Required

New and improved highways require new high intensity street lighting. Once again the type of fixture, the pole support, the supply to it, all become factors to review. One of the major load builders is going to be better highway illumination. The present luminaire equipment and lighting methods are not adequate. Whatever is finally developed should be either attractive in appearance or unobtrusive in the daytime and provide a high-intensity glareless light at night.

One of the problems in connection with the load growth of the commercial and domestic consumer is the inadequacy of wiring on the secondaries and incoming services and on the customer's property. A possible solution is an increase in the secondary voltage. This is being tried in some test areas and information from these installations should help to decide this question. Lighting and small appliances may be supplied at the present voltage level with major appliances and loads such as air conditioning and electric heating supplied at a higher voltage.

There are trying times ahead as the industry continues in the race to keep ahead of the expansion in the use of our product. It is difficult to accept these accelerating growths as natural and healthy.

The future is thought of in terms of the past, with sometimes a conviction that this growth cannot continue, but instead must flatten out. Let us banish this thought from our planning. Geometric growth and development show up in many natural laws. Just two examples are the sensitivity of our eyes to light and our ears to sound, both of which are exponential functions.

The market for energy is expanding in many directions and our promotion and sales must be geared to this expansion. There is no intention to give the impression that load growth will be automatic, but to show that the market has unlimited potential for development. Problems of financing and construction of physical facilities face us. Each of the fields of sales, financing, engineering and operation requires capable and well-informed employees with management and leadership of the highest calibre. Ahead of our industry are many challenging problems that cannot be solved by using yesterday's methods. More research, more pioneering and progressive thinking, more new techniques must be developed.

Throughout the development and growth of our industry there has been a multiple partnership that has speeded progress, conserved manpower and reduced cost. This is the traditional partnership between all operating utility companies and the manufacturers. Our industry has made available full information on progress and on difficulties experienced with new developments so that the knowledge of one is shared by all. An active teamwork philosophy has grown up between the equipment manufacturers and the utility industry with the objective of developing better and more reliable equipment and of steadily moving forward technically and economically. This spirit must be fostered and strengthened and the manufacturing industry encouraged to expand these advanced developments even more aggressively.

The electric utility industry must expand its activities in the field of research. Greater attention to applied research can produce results many times greater than the effort and expense involved. Scientific knowledge is expanding at an unprecedented rate and constant vigilance is needed to utilize new developments promptly and effectively.

The key to the future of our dynamic industry lies in the most effective use of science and technology for the problems ahead. We must encourage and support research by the manufacturers, but must also provide leadership in research and development in the field of applications of new techniques and devices and in exploring new or advanced concepts not yet ready for commercial utilization. Economic research must be intensified to determine how best to maintain and reinforce our economic health.

I view the future with great optimism. The problems we face are not fundamental weaknesses in our growth pattern. Positive steps to meet our obligation and assure ample Capacity, increased Acceptability, adequate Reliability and higher Economy will provide a healthy base on which to build unlimited growth.

Requisites for Successful Financing in the Future

By Dr. Herbert B. Dorau

Professor of Economics, Chairman of Department of Public Utilities and Transportation, New York University

THAT this industry, which has come to be "America's number one corporate credit," should be sufficiently concerned about its capacity to command capital to make the question the subject of formal discussion on an occasion of this character would seem at first to be somewhat anomalous. Yet the healthiest are often most concerned about their health and the best students seem, in my experience, most concerned about their examinations. Maybe that is why the superior are superior and probably why intelligent apprehension is essential to remaining superior.

Subjects for Concern

In this instance of an economic "look and see" as to the "Requisites for Successful Financing in the Future" we might ask whether we are, or ought to be, intelligently concerned as to:

- Whether we are as good as the investor thinks we are; whether we deserve the adulation of the capital markets.
- Or, whether we can or will be able to live up to the reputation now enjoyed and meet the great expectations which investors have built up.
- Or, whether there are developments external to the industry and its investor relations which in spite of all the excellence of financial reputation may make the obtainment of the capital requirements of the future difficult.
- Or perhaps whether, in view of indicated changes in (a) the pattern of capital costs, and (b) the composition and structure of the market for utility securities, some basic changes in utility corporate financial policy are not clearly required.

So, possibly the subject is not as simple as it might appear and the answers far from obvious.

The future availability of capital is obviously important at all times to a highly capitalistic industry. And "capitalistic" is not a naughty 12-letter word. It only means that the capital factor of production is relatively important in this industry and that it is necessary to raise and employ $4.00 of capital to do $1.00 of business in revenue earned. For the benefit of those who may differ with my ratios, for these as well as other purposes, the assets generated by depreciation reservations of revenues are just as much capital employed to produce service as assets reflecting funds from other sources even though under bookkeeping regulation, as practiced in many jurisdictions, such assets are not allowed to earn a return and thus contribute by so much less to the revenue of the enterprise. And since this aspect of the basis of income and credit of the industry has been raised, we might as well finish it here and now by noting that as the depreciation reserves and the assets generated by such reservations increase, the economic burden of the management responsibility and the assumption of all the risks associated with the active use of the assets reflected by depreciation reserves will become an increasing disadvantage to the equity investment; will further raise the "all-expense ratio," increase "leverage above the line" and make for greater income volatility.*

Elementary Matter

It would seem most elementary that the equity capital should be allowed to keep what it earns by taking the risks of leverage in capital employment. When such leverage income results from the use of investor debt capital the principle is generally respected under regulation, but when it comes to the use of even more senior and highest priority capital, that which is reflected by depreciation reserves, in only a few jurisdictions is the equity and economy of giving the risk reward to those who take the risk respected. When the depreciation prepayment reserve equals the equilibrium 50 percent, the stock capital takes all of the risk for less than half the risk compensation. Income so burdened will be discovered to be more hazardous income and should not command the market confidence of a flow of income which can claim what it earns. Beyond the level of reasonable assurance, assets generated by depreciation reservations when deducted for rate base purposes represent the most costly capital any utility obtains.

Since capital is such an important factor in this industry, the getting of the capital is a most important business function and the assured ability to get it when needed is the great intangible asset of a going utility enterprise. That asset deserves respect and careful pro-

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 8, 1959.

*An excellent paper on the basic principle is the Panel Discussion of "The Treatment of Accelerated Depreciation for Rate Making Purposes" presented by Commissioner Krueger of the Ohio Public Utilities Commission at the NARUC 70th Annual Convention, 1958.

tection by both enterprise management and regulatory authority.

Credit has been defined as "what you got when you don't need it." But a utility has to be able to get capital at any time. The full impact of the continuing necessity to be able to command capital on favorable terms is not commonly appreciated by non-utility businessmen and too often also not by regulatory authorities. The reserve assured-capacity to get capital when needed is the great economic reserve against contingencies on a par with reserve generating capacity in the technological area. The uninformed and unappreciative need to be told how a utility must expand to meet the demand of the market which it sees fit to occupy as an exclusive service agency, is legally obligated to expand whether conditions are favorable or not, whether the money market is tight or easy, whether the additional business appears attractively profitable or not. Good utility credit is no fair-weather craft; it is an essential business requisite that has to be able to take it as it comes, fair or foul.

Bare Subsistence Wage Not Enough

A bare subsistence wage for capital obviously will not meet such needs and standards. Stand-by reserve-borrowing-capacity and a buffer margin of earnings are as much the economic assurance of the capacity to serve as is stand-by physical capacity. Both cost something but are worth what they cost.

The fact that a utility must expand to meet its legal obligation will in the near term become of greater significance. Two factors are converging to impose a need for more capital for the electric industry, as never before.

They are: the impending explosive growth in population; and the accelerated response of more intensive use of electricity as the rise in the standard of living, and electric living in particular, gains momentum.

We are growing at the rate of one person every 11 seconds. From 1958 to 1970 we will add another 30 million, and population, like capital at interest, compounds so that our far-sighted philosophers are anticipating a crowded world, a crowded nation and even a shortage of space as such.

Either development alone would test the electric industry's capacity to command capital. With an impact more coincident than may be desired or economical, these two bases for an unprecedented expansion of electrical capacity and consumption may again make the obtainment of the needed capital the industry's number one concern.

The importance of the impending bulge in growth for our purposes is the demand for capital and the new financing which it will generate. In one sense the total responsibility will be but the sum of the individual responsibilities of each and every enterprise pressed to expand and to find the money. In another sense there is a collective responsibility since what separate enterprises may be able to do is conditioned by the general regard, reputation and standing of the industry as a whole.

In an even larger sense electric service—adequate and reliable electric service—has become a top social responsibility for peace and for defense. At this level of the transcendent social interest there also develops an over-all social, public and political responsibility.

It is difficult for a single enterprise in an industry to rise to a unique command of investor faith and confidence against the general reputation of such a class of enterprise. It is also difficult for an industry as a whole to turn in a top performance in the face of an adverse institutional framework and political obstructionism. Thus the political-economic environment of the times severely limits what an industry as a whole can accomplish. Give but one thought to what transportation genius could do for this country in short order if it were but given a revised political climate, or if just one change were made, the removal of dual regulation, regulation by both public authority and competition. Eliminate one form of regulation, and we would quickly have a renaissance of transport economy in place of what now only gets progressively worse.

By comparison with transport, the position of the electric industry is a bed of roses. No longer, at least, is it necessary to meet the general political muck-raking of the nineteen thirties and its disturbance of investor confidence.

While at the moment the problems of the general political environment seem less disturbing than for some time, or localized at least, the seeds of nationalization and socialization, in substance if not in form, are still with us. Come into my network, governmentally-owned and interconnected, says the political spider to the fly and that would, as always, be the end of the enterprising fly. Socialization periodically emerges as a disturbing threat to the investor confidence. At a local level socialization has long been technologically obsolete; based on water power it appears to have almost run its course, but projected through a national politically controlled network, all could yet be undone and effective socialization achieved. The historical significance of "the grid" in the history of English electricity socialization is not a happy, but possibly a warning, recollection.

A Climate of Confidence

Barring a return visit of national socialism in the United States, the large over-all environment would seem to justify investor confidence in considerable depth. Ever with us, however, is the threat of further inflation which, combined with regulatory policies dedicated to bookkeeping bigotries instead of economic realities in such matters as a rate base, depreciation and rate of return, does threaten further liquidation of investments in the electric industry and conversely favors other industries which are not by law made the special and peculiar victims of inflation. It was probably general investor unawareness of the especially unfair impact of inflation on utility equities and the "creeping" rather than "explosive" character of our inflation that retained investor confidence. It was that and probably the hope and belief that the loss was absorbed by the unfortunate past investor and that it won't recur and impair the new or added investment. Hope does seem to spring eternal and maybe it is that eternal congenital optimism of man that carries us through.

The fact is that six 50-cent dollars of return do afford a 6 percent return on an investment of a hundred 50-cent dollars. The fact is that a return of six 50-cent dollars on an investment of a hundred 100-cent dollars is only a 3 percent return and thus is from the 6 percent level a 50 percent liquidation of the investor's savings. The renewed threat of inflation can prove to be the major obstacle to successful financing of the great expansion

ahead. Frankly, what would happen if the investor in utility equities should discover that he is in most jurisdictions as vulnerable to inflation as if he invested in a bond and that there is a public policy discriminating against utility equities in this important respect.

The need for additional capital will set new records. Most forecasts will probably fall short. Responsive as this industry is to population growth, the demand will be multiplied further by the rise in the standard of living, more customers with more uses and particularly the heavy uses. Increased capacity at higher prices, replacement at higher prices without the benefit of economic depreciation provision, and continued pressure for more labor-saving capital equipment, some maturities in bonds and withdrawals of reserves for higher taxes after the deferral period will all add to a magnificent record-breaking total of required financing, all of which must be really magnificent music to the bankers' ears.

Mere magnitudes, record-breaking large sums, need not, as such, gravely concern this industry. There is no reason to doubt that the capital will be available and forthcoming and that this industry will be able to command what it needs. If it doesn't or can't, who will?

The serious question is not will the industry be able to get the capital to finance its yet greatest period of growth but rather:

- On what terms and conditions?
- In what form?
- From where and from whom?

There has been a lot of fuzzy economic nonsense purveyed about the significance of the ability to get capital. The highest court and many lower-level repeaters have held the capacity to command capital as a standard of a fair rate of return or a fair return. Even the ability to borrow and evidence of actual successful borrowing have been asserted to prove that a fair return was being earned. Let's put that awful illogical cart before the horse in proper order once and for all.

Availability of Capital

Man is a two-legged animal but not all two-legged animals are men. A fair return gives command over capital but additional capital can be obtained even though the return earned is less than fair and even if less than the present average dollar cost of capital or an average of the past cost of debt capital and the present cost of equity, whatever that mug-wump statistic may mean. The simple historical fact, as well as the readily deducible fact is that capital and additional capital, in the amounts required, can be obtained from the money market at almost any time and under almost any realistically conceivable circumstances even though the enterprise is earning less than a fair rate of return. The railroad industry has made substantial additional investments and obtained additional capital. It has refinanced substantial sums yet I can't recall when it last earned a fair rate of return.

We recognize that credit is the capacity to command capital, but credit and good credit are rather different and possibly quite different. Good credit means the capacity to command capital on favorable terms but favorable is a relative term. A regulated utility enterprise has good credit when it can obtain the capital needed in the form and on the terms which do not impair the integrity and security of the previously invested capital.

The basis of credit, that is, good credit by the standards we have set up, is a prospective flow of income sufficient in quantity and reliably regular to pay the going wages of capital as of the time. One of the burdens of a good reputation, financial as otherwise, is the compulsion to live up to such a reputation and to perform in line with expectations. Investor experience and investor expectations are, therefore, significant standards both of which must be met by the flow of future income. The mighty so often fall harder than the lowly because so much more is expected of them. To project and defend a good financial reputation requires almost as much effort as to achieve such a reputation.

Income Has Three Bases

Electric utility income has three obvious bases:

- The basis in the technical efficiency and superiority of central station production of electricity and the common use of common means for its distribution.
- The basis in the economy of the use of centrally produced electricity.
- The basis in law of the right to earn a fair return if and to the extent feasible by virtue of the technical efficiency and economy of the service rendered.

There is nothing that we could say that would add to the strength of the position of the electric industry in its technical dimensions. Technical superiority, however, is not sufficient by itself. The service, its manner of production and rendition must also be on a solid economic basis. Here, also, the foundations of the electric utility industry are obviously very solid, disclosing only a few cracks here and there which are probably significant only so far as they may get worse. The tremendous economic expansion of the service achieved by the electric utility industry at prices which are generally far below what the market would be willing to pay, and is able to pay, indicates the wide margin of protection which exists against economic causes of credit impairment and thus the capacity to command capital. There probably is no significant element in the contemporary standard of living of the American people which affords such a tremendous consumers' surplus, that, in less technical economic language, means bargain prices.

There is, however, a third basis on which the flow of electric utility income also necessarily depends and which, unfortunately, is not as solidly assured as is the technical or the economic basis. We refer, of course, to the legal basis for the prospective income to which the supplier of utility capital must look for his compensation. Thus, no matter how technically efficient, or how economically sound the basis of utility income, it will be no better or adequate or assured than is permitted under the return formula imposed by public authority through regulation. It is in the legal basis of future public utility income that we find our greatest reason for concern.

The legal basis of income is a relatively volatile and unpredictable determinant of return. Technologies do not so radically change, and the economic basis for income production does not so quickly erode, yet if the legal standards do not allow the efficiencies of a superb technology and the economic margins offered by the market's "best bargain" to be reflected in a compensatory financial flow of return, superior technology and superior economy may yet be of little import. Even as the Supreme Court of the United States is the final faculty of economics,

regulatory law and procedure determine utility income. Public utility capital is captive capital, it can't economically withdraw in any short or medium term and in any case once "devoted" it cannot legally withdraw. It has no economic bargaining power as have rapid capital turnover enterprises. Past invested utility capital is wholly dependent on the meaning that the adjective "fair" is given in the phrase "fair return" and what is "fair" is what public authority thinks is fair.

Meaning of Regulated Industry

Thus we return to recognize the full meaning and import of being a regulated industry, namely, that it is not how efficient you are or how economic you are that determines the adequacy of a flow of income but how much you will legally be allowed to earn as compared with what you could earn. Thus the regulatory environment, its conventions and proceduralism, will be the final determinants of this industry's capacity to command that capital which it will need to meet its public obligation to expand and to serve all at reasonable rates. The engineers have done their job, the business managers have done theirs; maybe it's time now that the lawyers did theirs and obtained for this industry what is realistically and meaningfully a fair wage for the capital so efficiently and productively employed. Possibly, however, before we can expect this miracle from the legal talent, it may be necessary to create an environment of understanding and public sympathy to economic realism in regulation, to results that are economically fair rather than merely the arithmetic products of bookkeeping conventions. Maybe, also, it is not even by implication chargeable to the lawyers; possibly chicken-hearted management, seeking to avoid the trials and tribulations, the sheer toil and tears of rate case litigation, is the reason why this industry across the board has not earned a fair wage on the capital it has employed so efficiently and economically over the past 10 years.

The incremental investment at the even higher price level has not earned even the average rates of return allowed. Rate levels are obviously subsidized by the lower past dollar cost of the property and plant. Even in the capital structure the return is not reflective of the present cost of capital, and the income available to common stock capital is subsidized by the past lower interest cost of debt capital. We can do a bit of figuring on that point. The average contractual interest rate on formal funded debt of the class A & B industry in 1957 was 3.1 percent; in 1958, not available, but probably 3.2 percent. If the current effective cost of high quality debt capital of 4.4 percent were substituted for 3.2 percent the income available to the common equity would be reduced about 18 percent before income tax effects. We could go further and give effect to the difference between the past contractual rates on preferred stock capital and the near 5 percent rate reflecting current cost. Altogether it is seen that even as rates and the return on the high dollar cost of additional capital in property and plant are subsidized by the past "lower-number-of-larger-dollar" cost so also is the return earned by enterprise capital, the common stock equity, subsidized by past lower contractual cost of debt and preferred stock capital. The moral of all this, of course, for financial management is to determine what produces common stock income and for regulation to recognize that past cost of contractual capital has no proper place in fair rate of return determination except as it may be evidence of the current or prospective cost of such capital.

We are, I am sure, ready to defend the proposition that the electric utility industry is the prime corporate credit in the American economy today. But whether the industry could actually meet the standard of good credit, as we have identified it, may be another matter. Has the industry been able to obtain the capital needed without dilution or impairment of or prejudice to the past invested capital? Has it in fact done so over the past 10 or 12 years? Will it in fact be able to meet that standard in the period ahead?

Obviously the answer, as would be statistically developed, will differ as to whether it is assumed that dollars equal dollars, that the thing called a 1938 dollar is the same as the thing we trade in as a 1959 dollar, or whether it is assumed that the average invested dollar is the same unit of measurement as the dollar of income received in 1959. It is quite possible to have met all the standards of nominal dollar financial responsibility and investor expectations in nominal dollars and to enjoy the highest capacity to command additional investment dollars and yet to have seen the stockholder's equity investment substantially liquidated. There is an old saying that "what you don't know doesn't hurt you" and so possibly with many utility stock investors whose dollar investment has been in dollars well maintained but in economic substance sadly impaired.

Average Market Price Rises

I have made a few calculations based on the investor's experience as reflected by Moody's well-known selection of 24 utility common stocks for 1946-1958. (Page 169.) The unit of investment is a weighted composite share corrected for stock splits and stock dividends. It may be noted that the average market price per share has increased from $32.14 in 1946 to $63.21 in the fourth quarter of 1958. The end of February, 1959, average price was $67.40. This looks good on the face of it but suddenly we recall that a share is not a share and that a share is no more a constant and reliable unit of measurement than is the dollar. There have been retained earnings and stock financing at prices above the book value base. The book equity per share has also almost doubled from $21.74 in 1946 to $40.02 in 1957. (Book equity figures per average share for 1958 are not yet available.) We might hope that the share would increase in price at least by as much as it increased in book value. To the extent that it did is illustrated by the fact that it appears the market price (per constant share) per $100 of book equity never again reached the $147.84 of 1946. The price for 1947 of $120.19 was nearly the same as $121.69 for 1958. The average price per constant size share in 1957 was lower than for the eight preceding years, as well as substantially below 1946.

Dividends per $100 of book equity were $6.12 in 1957 and this was the lowest for the period under review.

Earnings per constant share of $100 in book equity were also lower in 1957 ($8.52) than in any year of the period. In fact they were substantially higher at $10.04, $10.58 and $10.49 during the years 1948-1950, since

which period they have been declining except for a slight one-year reversal of trend in 1955 at $9.19.

The cumulative retained earnings per share amounted to $10.10 in 1958; $9.00 by the end of 1957. The increase in book equity from 1946-1957 was $18.28. Thus the $9.00 of cumulative retained earnings was substantially half of the growth in the size of the share. Most of the balance can be imputed to sales of additional stock at proceeds per share above book values.

How an investor might have fared over the 12-year period may be seen where it is assumed that one composite or average share was purchased each year at fourth quarter average prices. Thus the 1946 purchase was at a 6.81 percent earnings price ratio. On the "share" cost in 1946 the earnings in 1958 were 11.29 percent. Similarly each year's purchase base is carried through to 1958. The average of earnings on the 13 acquisitions in 1958 was 9.86 percent; the weighted average 11.10 percent. This looks good, on the face of it, but it is necessary to recall that these are in part earnings on earnings never received. The investor was compounding himself.

Here a similar experience in terms of dividends is set forth: an acquisition in the fourth quarter of 1946 on a 4.57 percent dividend yield basis has become 7.87 percent in 1958. One share unit acquired each year produces an average return of 6.88 percent in 1958; the average, weighted by number of years obtained, is 7.74 percent. Again, what more can you ask for or expect, but it may be worth noting that the dividends per $100 of equity are lower at 6.12 percent in 1957 (last year available) than in any year of the period and were as high as 7.41 percent in 1950. The gain is all in the increased size of the share from the several causes which brought that about, particularly retained earnings and the sale of additional shares at prices above then existing book values.

From 1946 to 1958

The 1946 purchaser has received in total $25.83 in dividends and $31.07 appreciation, or a total of $56.90 through 1958; through 1957, $39.86, or $4.38 per year average to 1959 and $3.32 per year average to 1958. This looks like a 10 percent or better average but this took 12 and 13 years to realize and there is such a factor as the discountability of time of waiting. A discounted worth would be substantially less.

A similar analysis of experience with Moody's 125 industrial stocks is shown on Page 170.

The next question is what kind of money capital is the industry going to obtain?

The categorical answers can be brief and to the point, namely the kind of capital it will choose to get.

Real old-fashioned financial standards suggest that enterprise obtain common stock capital when the getting is good and build up a borrowing capacity reserve by reducing debt ratios at such times. Today would seem to be the appointed time. Whether the appointed time will last long enough for you "to ready that stock offering" I don't know. For my money the turn is long overdo.

If the industrial stock market is not a record-breaking, over-valuation of the shares, a very substantial increase in the earnings of industrial enterprise must be at hand and soon. Can you intelligently anticipate the same or similar for electric utility common stock earnings?

Security price rises are by nature contagious. Utility stocks have responded sufficiently so as to reflect very low earnings and dividend price ratios by comparison with the past and by comparison with more stable money rates as reflected by bond and preferred stock yields. In some instances these stock ratios are now so low that the enterprise could sell stock and buy government bonds, sort of an operation-in-stock-piling equity capital against the day when it may be needed if not now.

Utility Debt Capital

Utility debt capital today costs a full 2 percent in yield more than in May, 1946. I suspect that for similarly circumstanced and protected equity capital, stock investors also now expect 2 percent more but you would not suspect it from the ratios of dividends and earnings to stock prices.

Obviously great expectations have also been built up in utility common stock investors' minds as to the future earnings which justify such high prices.

This we view with alarm.

Barring a widespread conversion of regulatory practice and belief to economic principles and a renouncing of the false gods of nominal dollar bookkeeping, it just won't happen. Therefore, we fear an investor disillusioned as we do a woman scorned.

It is such caution that seems to restrain some enterprises from common stock financing that should have already taken place.

With some of these more technical aspects of the problem of getting the capital I would be brief and therefore somewhat categorical:

- The equity ratio of many electric utilities should be improved; the industry as a whole might well establish a backlog of reserve borrowing capacity.
- The price at which stock is offered and pro-rata-taken by existing stockholders is immaterial; it is the future earnings per dollar invested and not as related to share prices that is material. Stock offered at favorable relations to market prices and favored by a sustained dividend rate per share only gives the investor something more in the form of an implicit (a real) dividend increase.
- Stockholders who sell their rights are selling part of their holding and, if at prices high by comparison with their purchase price, they make a real gain.
- Stock dividends and sustained dividend rates are but a deferral of dividends, a future dividend on a dividend in place of all the dividend now. The device short circuits the obtainment of capital and may defer or even avoid some taxes.
- Stock offerings to the public, new investors, could hardly be justified at prices less than what can be obtained in this market but such financing if at some of the extreme ratios now exhibited on the market could easily set up false expectations and unfavorable future reactions.
- Stock offerings to old stockholders at significant concessions below the market may well be made to increase the equity ratios and to increase reserve borrowing capacity. Debt capital costs are high and the terms of the commitment made are meaningful for the possible future net income. There is no danger in stock offerings to stockholders since the price per share has no significance

Investor Experience with Common Stocks of Moody's 24 Public Utilities

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
1. Market price[a] in fourth quarter of indicated year	$32.14	$26.61	$26.80	$30.07	$30.57	$33.35	$37.15	$39.30	$46.02	$49.26	$48.71	$48.70	$63.21
2. Annual earnings[a] (on a per share basis)	2.19	2.16	2.22	2.36	2.62	2.44	2.62	2.78	2.94	3.21	3.35	3.41	3.63
3. Annual dividends[a] as indicated in fourth quarter of indicated year (on a per share basis)	1.47	1.58	1.62	1.68	1.85	1.90	1.92	2.08	2.13	2.26	2.36	2.45	2.53
4. Ratio of earnings for each year(line 2) to market prices in fourth quarter of year of purchase[b] (line 1):													
Line 2 ÷ $32.14	6.81 %	6.72 %	6.91 %	7.34 %	8.15 %	7.59 %	8.15 %	8.65 %	9.15 %	9.99 %	10.42 %	10.61 %	11.29 %
Line 2 ÷ 26.61		8.12	8.34	8.87	9.85	9.17	9.85	10.45	11.05	12.06	12.59	12.81	13.64
Line 2 ÷ 26.80			8.28	8.81	9.78	9.10	9.78	10.37	10.97	11.98	12.50	12.72	13.54
Line 2 ÷ 30.07				7.85	8.71	8.11	8.71	9.25	9.78	10.68	11.14	11.34	12.07
Line 2 ÷ 30.57					8.57	7.98	8.57	9.09	9.62	10.50	10.96	11.15	11.87
Line 2 ÷ 33.35						7.32	7.86	8.34	8.82	9.63	10.04	10.22	10.88
Line 2 ÷ 37.15							7.05	7.48	7.91	8.64	9.02	9.18	9.77
Line 2 ÷ 39.30								7.07	7.48	8.17	8.52	8.68	9.24
Line 2 ÷ 46.02									6.39	6.98	7.28	7.41	7.89
Line 2 ÷ 49.26										6.52	6.80	6.92	7.37
Line 2 ÷ 48.71											6.88	7.00	7.45
Line 2 ÷ 48.70												7.00	7.45
Line 2 ÷ 63.21													5.74
Average	6.81 %	7.42 %	7.84 %	8.22 %	9.01 %	8.21 %	8.57 %	8.84 %	9.02 %	9.52 %	9.65 %	9.59 %	9.86 %
						Weighted average[c]			9.66 %	10.36 %	10.62 %	10.62 %	11.10 %
5. Ratio of dividends for each year (line 3) to market prices in fourth quarter of year of purchase[b] (line 1):													
Line 3 ÷ $32.14	4.57 %	4.92 %	5.04 %	5.23 %	5.76 %	5.91 %	5.97 %	6.47 %	6.63 %	7.03 %	7.34 %	7.62 %	7.87 %
Line 3 ÷ 26.61		5.94	6.09	6.31	6.95	7.14	7.22	7.82	8.00	8.49	8.87	9.21	9.51
Line 3 ÷ 26.80			6.04	6.27	6.90	7.09	7.16	7.76	7.95	8.43	8.81	9.14	9.44
Line 3 ÷ 30.07				5.59	6.15	6.32	6.39	6.92	7.08	7.52	7.85	8.15	8.41
Line 3 ÷ 30.57					6.05	6.22	6.28	6.80	6.97	7.39	7.72	8.01	8.28
Line 3 ÷ 33.35						5.70	5.76	6.24	6.39	6.78	7.08	7.35	7.59
Line 3 ÷ 37.15							5.17	5.60	5.73	6.08	6.35	6.59	6.81
Line 3 ÷ 39.30								5.29	5.42	5.75	6.01	6.23	6.44
Line 3 ÷ 46.02									4.63	4.91	5.13	5.32	5.50
Line 3 ÷ 49.26										4.59	4.79	4.97	5.14
Line 3 ÷ 48.71											4.84	5.03	5.19
Line 3 ÷ 48.70												5.03	5.20
Line 3 ÷ 63.21													4.00
Average	4.57 %	5.43 %	5.72 %	5.85 %	6.36 %	6.40 %	6.28 %	6.61 %	6.53 %	6.70 %	6.80 %	6.89 %	6.88 %
						Weighted average[c]			7.00 %	7.29 %	7.48 %	7.63 %	7.74 %
	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
6. Indicated dividend pay-out ratio (line 3 ÷ line 2)	67.1 %	73.1 %	73.0 %	71.2 %	70.6 %	77.9 %	73.3 %	74.8 %	72.4 %	70.4 %	70.4 %	71.8 %	69.7 %
7. Retained earnings													
(i) for year (line 2 - line 3)	$ .72	$ .58	$ .60	$ .68	$ .77	$ .54	$ .70	$ .70	$ .81	$ .95	$ .99	$ .96	$ 1.10
(ii) cumulative	--	1.30	1.90	2.58	3.35	3.89	4.59	5.29	6.10	7.05	8.04	9.00	10.10
8. Common stock book equity per share													
(i) at year end	$ 21.74	$ 22.14	$ 22.11	$ 22.31	$ 24.97	$ 27.20	$ 28.75	$ 31.04	$ 33.43	$ 34.94	$ 38.00	$ 40.02	n.a.
(ii) average for year	--	21.94	22.12	22.21	23.64	26.08	27.98	29.90	32.24	34.18	36.47	39.01	--
9. Earnings (line 2) per $100 of book equity													
(i) at year end (line 8. i)	$ 10.07	$ 9.76	$ 10.04	$ 10.58	$ 10.49	$ 8.97	$ 9.11	$ 8.96	$ 8.79	$ 9.19	$ 8.82	$ 8.52	--
(ii) average for year (line 8. ii)	--	9.85	10.04	10.63	11.08	9.36	9.36	9.30	9.12	9.39	9.19	8.74	--
10. Dividends (line 3) per $100 of book equity													
(i) at year end (line 8. i)	$ 6.76	$ 7.14	$ 7.33	$ 7.53	$ 7.41	$ 6.99	$ 6.68	$ 6.70	$ 6.37	$ 6.47	$ 6.21	$ 6.12	--
(ii) average for year (line 8. ii)	--	7.20	7.32	7.56	7.83	7.29	6.86	6.96	6.61	6.61	6.47	6.28	--
11. Market price (line 1) per $100 of book equity													
(i) at year end (line 8. i)	$147.84	$120.19	$121.21	$134.78	$122.43	$122.61	$129.22	$126.61	$137.66	$140.98	$128.18	$121.69	--
(ii) average for year (line 8. ii)	--	121.29	121.16	135.39	129.31	127.88	132.77	131.44	142.74	144.12	133.56	124.84	--
12. Cumulative retained earnings (line 7. ii) as percent of book equity at year end (line 8. i)	--	5.9 %	8.6 %	11.6 %	13.4 %	14.3 %	16.0 %	17.0 %	18.2 %	20.2 %	21.2 %	22.5 %	--

Sources: Moody's Investors Service - Public Utilities, lines 1, 2, 3 and 8. i as computed and reported by source.

(a) Market prices, earnings and dividends are weighted by the number of shares outstanding at year end, adjusted for stock splits and stock dividends.

(b) Assuming purchases of that number of shares of each company, proportionate to the number of shares outstanding for that company at year end to total number of outstanding shares for all twenty-four companies, after adjustment of number of shares for stock splits and stock dividends.

(c) Weighted by number of years from year of purchase to the year of the determination (1954, 1955, 1956, 1957 and 1958 respectively).

n.a. Not available.

Investor Experience with Common Stocks of Moody's 125 Industrials

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
1. Market price[a] in fourth quarter of indicated year	$44.79	$46.96	$47.03	$50.70	$62.63	$72.60	$77.81	$76.64	$108.81	$141.14	$147.32	$132.09	$170.38
2. Annual earnings[a] (on a per share basis)	3.53	5.32	7.03	6.60	8.45	7.37	7.18	7.71	8.38	10.51	10.35	10.27	8.35
3. Annual dividends[a] as indicated in fourth quarter of indicated year (on a per share basis)	1.97	2.51	3.08	3.32	4.34	4.25	4.17	4.26	4.64	5.57	5.88	5.89	5.65
4. Ratio of earnings for each year (line 2) to market price in fourth quarter of year of purchase[b] (line 1):													
Line 2 ÷ $ 44.79	7.88 %	11.88 %	15.70 %	14.74 %	18.87 %	16.45 %	16.03 %	17.21 %	18.71 %	23.47 %	23.11 %	22.93 %	18.64 %
Line 2 ÷ 46.96		11.33	14.97	14.05	17.99	15.69	15.29	16.42	17.84	22.38	22.04	21.87	17.78
Line 2 ÷ 47.03			14.95	14.03	17.97	15.67	15.27	16.39	17.82	22.35	22.01	21.84	17.75
Line 2 ÷ 50.70				13.02	16.67	14.54	14.16	15.21	16.53	20.73	20.41	20.26	16.47
Line 2 ÷ 62.63					13.49	11.77	11.46	12.31	13.38	16.78	16.53	16.40	13.33
Line 2 ÷ 72.60						10.15	9.89	10.62	11.54	14.48	14.26	14.15	11.50
Line 2 ÷ 77.81							9.23	9.91	10.77	13.51	13.30	13.20	10.73
Line 2 ÷ 76.64								10.06	10.93	13.71	13.50	13.40	10.90
Line 2 ÷ 108.81									7.70	9.66	9.51	9.44	7.67
Line 2 ÷ 141.14										7.45	7.33	7.28	5.92
Line 2 ÷ 147.32											7.03	6.97	5.67
Line 2 ÷ 132.09												7.78	6.32
Line 2 ÷ 170.38													4.90
Average	7.88 %	11.60 %	15.21 %	13.96 %	17.00 %	14.04 %	13.05 %	13.52 %	13.91 %	16.45 %	15.37 %	14.63 %	11.35 %
							Weighted average[c]		15.78 %	19.18 %	18.30 %	17.62 %	13.90 %
5. Ratio of dividends for each year (line 3) to market price in fourth quarter of year of purchase[b] (line 1):													
Line 3 ÷ $ 44.79	4.40 %	5.60 %	6.88 %	7.41 %	9.69 %	9.49 %	9.31 %	9.51 %	10.36 %	12.44 %	13.13 %	13.15 %	12.61 %
Line 3 ÷ 46.96		5.34	6.56	7.07	9.24	9.05	8.88	9.07	9.88	11.86	12.52	12.54	12.03
Line 3 ÷ 47.03			6.55	7.06	9.23	9.04	8.87	9.06	9.87	11.84	12.50	12.52	12.01
Line 3 ÷ 50.70				6.55	8.56	8.38	8.22	8.40	9.15	10.99	11.60	11.62	11.14
Line 3 ÷ 62.63					6.93	6.79	6.66	6.80	7.41	8.89	9.39	9.40	9.02
Line 3 ÷ 72.60						5.85	5.74	5.87	6.39	7.67	8.10	8.11	7.78
Line 3 ÷ 77.81							5.36	5.47	5.96	7.16	7.56	7.57	7.26
Line 3 ÷ 76.64								5.56	6.05	7.27	7.67	7.69	7.37
Line 3 ÷ 108.81									4.26	5.12	5.40	5.41	5.19
Line 3 ÷ 141.14										3.95	4.17	4.17	4.00
Line 3 ÷ 147.32											3.99	4.00	3.84
Line 3 ÷ 132.09												4.46	4.28
Line 3 ÷ 170.38													3.32
Average	4.40 %	5.47 %	6.66 %	7.02 %	8.73 %	8.10 %	7.58 %	7.47 %	7.70 %	8.72 %	8.73 %	8.39 %	7.68 %
							Weighted average[c]		8.74 %	10.17 %	10.40 %	10.10 %	13.90 %
	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
6. Indicated dividend pay-out ratio (line 3 ÷ line 2)	55.8 %	47.2 %	43.8 %	50.3 %	51.4 %	57.7 %	58.1 %	55.3 %	55.4 %	53.0 %	56.8 %	57.4 %	67.7 %
7. Retained earnings													
(i) for year (line 2 - line 3)	$ 1.56	$ 2.81	$ 3.95	$ 3.28	$ 4.11	$ 3.12	$ 3.01	$ 3.45	$ 3.74	$ 4.94	$ 4.47	$ 4.38	$ 2.70
(ii) cumulative	--	4.37	8.32	11.60	15.71	18.83	21.84	25.29	29.03	33.97	38.44	42.82	45.52
8. Common stock book equity per share													
(i) at year end	$ 30.82	$ 34.08	$ 38.67	$ 42.40	$ 47.13	$ 50.39	$ 54.15	$ 57.59	$ 63.66	$ 68.34	$ 72.41	$ 77.35	n.a.
(ii) average for year	--	32.45	36.38	40.54	44.76	48.76	52.27	55.87	60.62	66.00	70.38	74.88	--
9. Earnings (line 2) per $100 of book equity													
(i) at year end (line 8. i)	$ 11.45	$ 15.61	$ 18.18	$ 15.57	$ 17.93	$ 14.63	$ 13.26	$ 13.39	$ 13.16	$ 15.38	$ 14.29	$ 13.28	--
(ii) average for year (line 8. ii)	--	16.39	19.32	16.28	18.88	15.11	13.74	13.80	13.82	15.92	14.71	13.72	--
10. Dividends (line 3) per $100 of book equity													
(i) at year end (line 8. i)	$ 6.39	$ 7.37	$ 7.96	$ 7.83	$ 9.21	$ 8.43	$ 7.70	$ 7.40	$ 7.29	$ 8.15	$ 8.12	$ 7.61	--
(ii) average for year (line 8. ii)	--	7.73	8.47	8.19	9.70	8.72	7.98	7.62	7.65	8.44	8.35	7.87	--
11. Market price (line 1) per $100 of book equity													
(i) at year end (line 8. i)	$145.33	$137.79	$121.62	$119.58	$132.89	$144.08	$143.69	$133.08	$170.92	$206.53	$203.45	$170.77	--
(ii) average for year (line 8. ii)	--	144.71	129.27	125.06	139.92	148.89	148.86	137.18	179.50	213.85	209.32	176.40	--
12. Cumulative retained earnings (line 7. ii) as percent of book equity at year end (line 8. i)	--	12.8 %	21.5 %	27.4 %	33.3 %	37.4 %	40.3 %	43.9 %	45.6 %	49.7 %	53.1 %	55.4 %	--

Source: Moody's Investors Service - Industrials, lines 1, 2, 3 and 8. i as computed and reported by source.

(a) Market prices, earnings and dividends are weighted by the number of shares outstanding at year end, adjusted for stock splits and stock dividends.

(b) Assuming purchases of that number of shares of each company, proportionate to the number of shares outstanding for that company at year end to total number of outstanding shares for all one hundred and twenty-five companies, after adjustment of number of shares for stock splits and stock dividends.

(c) Weighted by number of years from year of purchase to the year of the determination (1954, 1955, 1956, 1957 and 1958 respectively).

n.a. Not available.

except to those who will sell rights and those who buy them. It needs to be understood that a sustained "explicit" dividend rate means an "implicit" in fact dividend yield increase when rights to subscribe have a value. How much of a dividend increase of this character the particular enterprise can afford may well determine how much additional stock should be offered at how much of a concession in price.

• The years 1958-1959 will be remembered as the time when common stock money should have been obtained even beyond immediate needs.

As to debt capital it would seem the part of conservative prudence to plan a reduction in the debt ratio so that as the interest requirements at higher rates come into effect the times interest coverages of the past will be maintained. Except as we again inflate the money supply debt, capital costs will probably remain at the natural interest rate levels to which we returned as the "money jag" of the big inflation wore off.

A Mug-Wump Situation

As to preferred stock, the problem is as it always has been, a mug-wump situation. If it were in the form of debt the debt ratio would violate well-established conventions and limits. Viewed in terms of after-tax-effect-cost of capital, the cost is high compared with debt capital, even at natural interest rate levels.

In view of its priority and the compulsion on management to treat preferred dividends as practically a fixed charge, the cost seems high compared with the basis on which investors are at least now willing to take a common stock position.

Institutions which have the golden touch of transmuting a taxable income into a substantially tax-free income may come even more to desire this class of security. It seems to me in the present and probable future setting to be more attractive as a medium of investment than as a medium of financing except as it is the means of avoiding penetration of the 50 percent debt ceiling and for that it seems a rather costly expedient compared to the availability of common stock capital.

Our position has become somewhat clarified. We are not merely satisfied to be able to obtain all the capital we may need, but we are also concerned as to the terms and conditions under which this capital is obtained. Thus, we not only want to be confident of being able to obtain the money, but want to deal fairly with the investor so that future credit may not suffer impairment due to present shortsightedness and what the future investor may view in retrospect as short-dealing. This, we have seen, is in part to be taken care of by the manner in which capital is obtained and the techniques employed. Whether the industry can live up to the great expectations which investors have developed will depend upon the regulatory environment and the manner in which public authority controls the future flow of income.

In my opinion it is high time that regulatory policy in the United States matured and came realistically to face economic facts. The policy of hiding behind the bookkeeping curtain, woven out of a systematic pattern of nominal dollar debits and credits, should give way to a more honest and socially ethical dealing with the nature of the economic sacrifice which utility stock investors made and the reality of the expected return.

It is high time that the electric industry become recognized as a business-managed business undertaking. The treatment of this great business as if it were a kind of an incorporated "performance of governmental function" needs to end.

If this is a business, it needs a business diet and a business environment to keep it healthy and make it strong enough to face, on its own credit and its own resources, the challenges of change, even radical change.

A healthy business environment holds forth a chance of gain but not a guaranty by implication or otherwise. The inducement offered by a chance of gain is something more than mere management response to a commission-administered, frequently revised, or revisable, and in effect, cost-of-service contract.

A business environment must hold forth some chance of extra compensation for a job well done and, particularly, a job which is being better done. Certainly a business environment is not provided under regulatory policy where all of the gains of initiative and enterprise are in advance committed to the consumer. We seem always to pay respect in words to the principle that good management and superior enterprise should have a chance to earn something additional for their performance, but where in utility regulations has this noble economic sentiment and unchallengeable principle ever been given conscious effect?

A business environment would clearly not be overcast with the ruling impression that because a utility is making a gain, because its earnings have increased, its rates are too high. The prospect of a chance of gain works miracles on the enterprising human mind which we have long known has a very strong propensity even to overvalue any indicated chance of gain.

The holding-out of a chance of true business gain would beget so much more in social economy for the small potential reward held out as obtainable if earned.

In fact, if we really believe in the economy of a private enterprise system as we protest we do—at least to the Russians—we must believe that the holding forth of a chance of gain is the lowest possible cost at which the advantages of great economies can be obtained for all.

Benefit for Customer

The true social economy of an enterprise environment for regulated industries is not peculiarly sought in behalf of the investor. Actually, his net-take is a very small percentage of the total social dividend which the spirit and effect of enterprise can produce. In our society as a whole, no one, certainly not the investor, would benefit as much from the recognition and application of the enterprise principle in public utility regulation as would the customer himself.

All that would be needed is a return to the original principle of regulation, namely, that it is rates that are subject to regulation and not returns. Nothing would do more for the customer in that it would curb his short-term cupidity in favor of the much larger long-term advantage.

Return regulation as such is basically uneconomic and inimical to the operation of initiative and enterprise in a free economy. Formal and formula limitation of the return which can be earned is not to the best social advantage viewed as the end of regulation. It would be a great advance if the return earned were merely viewed

as one of several available evidences as to the reasonableness and social economy of rates and not as a determinant. The principle should work both ways. The opportunity for real gains should be balanced by regulatory procedures which would "spank" the laggards, the recalcitrants and the incompetents.

The extent to which a management actually utilizes the social resources at its command in the form of property and plant, the extent to which it achieves a higher utilization factor and produces more want-satisfying electricity at lower average costs ought to be just as much a good and useful evidence of the reasonableness of rates as any statistically contrived cost of capital. Formula regulation has gone much too far. Of course it was easy; it made life simpler. With a formula at hand that difficult thing called judgment could be set aside and, unfortunately, has been.

Good Things Can Be Overdone

Every good thing can be overdone and certainly the reliance on bookkeeping records whose meaning one must really understand in order to take lightly and the statistical computations and calculations derived from the gyrations of stock markets and the results of a governmentally managed money market all fall into this category.

The social economic purpose of regulation was to offset and cancel the effect of monoply because it was an unavoidable by-product of the perfectly sound idea of having one utility enterprise occupying a single market.

We wanted the operational and investment economies of monopoly on the one hand and on the other we certainly did not want to subject ourselves to the temptation of monopoly pricing.

Logic would suggest that we subtract only the monopoly earnings from the return and leave the balance of the return earned to enterprise even as it is and can be claimed by enterprise in the competitive industrial areas.

Such an approach would never have resulted in a standard which claimed all the advantages of differential superiority, initiative and enterprise, which enterprise capital and management produced, for the customer. There is no economic sanction for the cost standard as such in utility regulation. At best that standard would be, by reference to all economic principles, present marginal cost with opportunity for the superior producer to share in his achievement and to be rewarded for the superior economy of his productivity.

The competitive current marginal cost standard would be an enlightened substitute for the aboriginal past cost standard as a guide to regulation and a standard of social economy, for utility rates are prices even like other prices. They are not exempt from the economic standards of what a price should be and what a price should do merely because they are utility prices.

Utility rates as prices may of course be viewed with cupidity from the standpoint of enterprise because they are a source of the revenue needed to continued solvency. They may be, and in fact are, viewed with cupidity by the consumer since they are a reduction of his purchasing power for alternative goods. Both of these approaches have in some respects been over-emphasized. I would say that public utility rates as prices should begin to be viewed from the standpoint of the social economy as a whole, which means they should be tested as to how well they perform the function of prices, how well they are operating to achieve economic equilibrium and maximum utilization of social resources while at the same time giving the consumers the lowest rates under which the most vital factor in our whole system of spontaneous economic interdependence, initiative and enterprise, can earn a truly compensatory return. The economic ends of society as a whole are finally and financially more important than the subsidiary interests of buyer and seller.

The basic approach and the detailed procedure of the contemporary regulatory process is oriented to the ideas of the economic class conflict and not social economy.

The flow of utility income, which is the ever-essential basis of utility credit and its command over capital, is at best precarious and in spite of the amazing technical efficiency and solid economic acceptance of the service. What would most secure and establish utility credit and make solid the third basis of the flow of future income would be a change in the conception of regulation from class conflict policeman to social economic statesmanship.

For a highly capitalistic industry, under legal compulsion to expand with the coming "population explosion" and with what we hope will also be a continued rise in our standard of economic well-being, the maintenance of good credit is of paramount enterprise and social importance.

The prime requisite of good utility credit is a prospective flow of income sufficient, in the first place, to attract the equity capital under a conservative capital structure and, in the second place, to allow investors a chance to realize that prospective rate of return which induced them to supply the needed capital. Realization of expectations must some time follow or the will to believe and the hope of reward may yet so deteriorate as to impair even the best of credit.

Any widespread failure of utility equity investors eventually to realize the return-expectation-rate, which induced them to supply the risk capital, will work havoc with the present high-level credit of the electric utility industry and prejudice the industry's capacity to raise the unparalleled volume of capital that will be needed and continue to be needed to finance an unprecedented and long-continuing expansion.

The technological basis of electric utility income is solidly established; the economic basis is firmly part of the very web and woof of our present industrial system. The area of recurring concern is the legal basis as reflected by regulatory climate and public policy. This is the vulnerable front.

Particularly essential to the successful financing of this industry's public responsibility to serve ever-larger numbers in an ever-larger way is the regulatory recognition of the fact that this industry is a business and will only thrive well in an environment hospitable to business enterprise. To this end there is required early regulatory recognition of the need for a rate-of-possible-return which will induce business enterprise at its best and investor assumption of the hazards of ever-more progress rather than a mechanistically derived cost of capital basis for a mere subsistence wage of capital.

Pricing Policies for Tomorrow

By Robert S. Quig
Manager, Rate Department, Ebasco Services Inc.

EVERY economic indicator available today points to the fact that the electric utility industry faces a future of continuing record growth. The increase in the nation's economy as forecast by the level of Gross National Product, together with the sizeable increase expected in population and family formation, makes evident that the demands for electric utility service may well produce sales at the end of the next 20 years approaching three trillion kilowatt-hours, which is 5½ times today's sales. Installed capacity required at the end of this same period will probably be over four times the present 145 million kilowatts. Assuming that privately-owned electric companies will continue to represent the present ratio of ownership in the future, over $150 billion of construction expenditure must be made by them to attain these objectives.

It is obvious that an expansion of this magnitude will involve substantial new money financing, for even now the industry generates internally only one-third of its new money requirements.

Function of Rate Making

The growth picture that is portrayed here is forcing utility managements to ask themselves these three questions:

- Will the utility price structure be adequate for the economic conditions of tomorrow?
- Will the regulatory concepts be broad enough to assure adequate service to customers and satisfactory return to investors?
- How should the utility be organized at the rate and economic research level to successfully carry out tomorrow's pricing policies?

The fundamental purpose of all public utility rate making is to produce the revenue requirements that will enable the company to provide adequate service to its customers and at a fair profit to the millions of investors who supply the capital. Public relations surveys have quite clearly indicated that electric rates may well be the key to public opinion on the whole issue of public-versus-private ownership of electric utilities. It is the customer's opinion of the cost of electricity, and not the cost itself, that is the important element.

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 8, 1959.

In developing the price structure for tomorrow, it is clearly evident that there must be a re-examination of past policies and, more particularly, an examination of the underlying economic changes that are taking place during this inflationary era. For the most part, the rate structure used by electric companies today was developed to serve under the conditions of the pre-inflationary period.

The pricing structure of a utility must recognize the basic economic conditicns of investment and expense on the one hand, and competitive conditions of value of service on the other. Fundamentally, the electric utility business is a business of "fixed and running charges." Considerations of policy determine the extent to which the fixed charges are spread on a unit basis over the running charges.

By means of a series of charts, we will see where the electric utility industry, as represented by the Class A and B investor-owned electric companies, stands today at the end of 11 years of inflation.

We propose to look at developments with respect to significant items of capital, revenue and expense. We will see the present economic posture of the industry and indicate pricing policy considerations for the future.

Trend of Return

The trend of return on net electric utility plant plus an adjustment for working capital shows a return in 1948 of 6.11 percent which has gone down to 5.58 percent by the end of the year 1958. (Figure 1.)

I want to make it very clear that the use of the net plant concept in no way implies that this is the sole base for determination of return. The guiding principles as to rate base that are available to utility regulatory commissions are well set forth in the legislation of the many states.

The important thing is that there has been a decline of about 9 percent in the rate of return on any standard of rate base in the face of ever-increasing inflation.

Trend of Electric Utility Capital Costs

The trend of costs of electric utility capital as measured by new issues of bonds and preferred stocks sold in the 11-year period uses the earnings-price ratio of

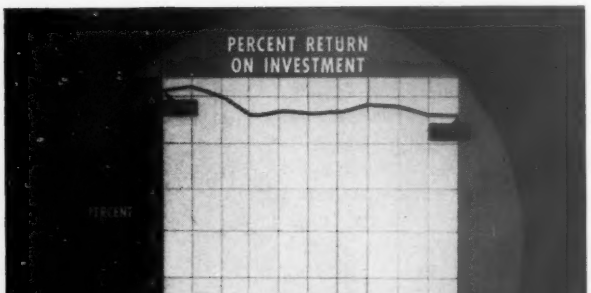

Figure 1

Figure 2

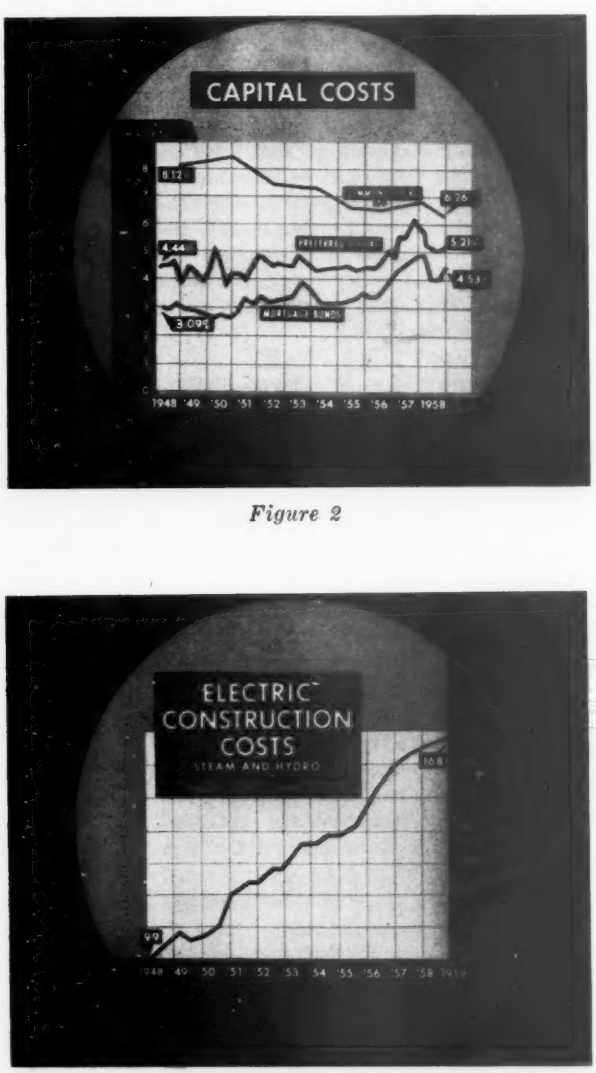

Figure 3

24 utility common stocks (Moody's) to indicate the general trend of equity capital. It must be recognized that the cost of common stock capital is not measured simply by relating present market prices to past earnings. As the NARUC 1958 Report of the Committee on Corporate Finance pointed out, such a ratio is "inadequate as a measure of the cost of common stock equity." (Figure 2.)

The downward trend in the earnings-price ratio of common equity is in large part attributable to the fact that utility equities have followed the general inflationary up-trend of the market, and to the fact that utility investors expect higher earnings will be attained through the orderly operation of the regulatory process. If the inflationary trend continues and utility equities cannot be kept as attractive on an earnings basis as alternative sources of investment of reasonably comparable risks, then the position of utility common equities will be seriously damaged. The ultimate test of a stock price is earnings to common. Real earnings to common in substantial proportions will be necessary in the years to come if utility equities are to sell on their own against heavy competition of equities of unregulated businesses.

With the demand for new plant at rising price levels and a constant need for new capital, it is crystal-clear that greater revenue must be developed to support the over-all capitalization.

The trend of steam and hydro plant costs are indicated on an index basis, on a per-kilowatt and a per-customer basis, and per dollar of operating revenue. Many companies are recognizing the substantial shifts that have occurred in the incidence of costs in all three major categories—those that are kilowatt-demand-related, those that are kilowatt-hour-related and those that are customer-related.

Trend of Electric Construction Costs

Electric construction costs, as measured by the Handy Whitman Index for combined steam and hydro construction, continue to show an upward trend. Over a period of 11 years, these costs have increased 70 percent,

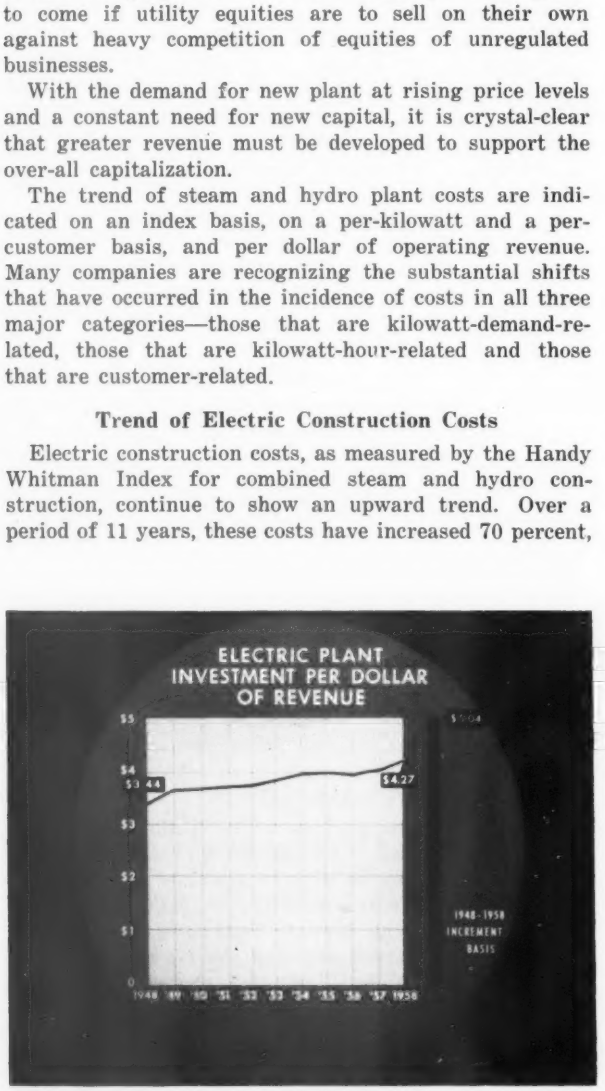

Figure 4

slowing now and then only in adherence to the basic laws of supply and demand, then picking up and moving along the upward path of inflation. (Figure 3.)

Trend of Electric Utility Plant Per Dollar of Revenue

There has been a substantial change in the electric utility companies' economic posture as measured by the amount of dollar investment necessary to produce a dollar of revenue. At the end of 1948 it took $3.44 of electric plant investment to produce one dollar of revenue. By the end of 1958 it took $4.27. Looking at the situation incrementally over the same period of years, it took $5.04 of investment for a dollar of revenue. (Figure 4.)

It is well known that a business, to be successful, must make the fullest utilization of the invested dollar. Proper pricing, expanded sales effort, and—in the case of utilities—regulatory cooperation and understanding can do much to improve this condition.

Trend of Electric Plant Investment Per Kilowatt

The cost of total electric plant in service, as measured per kilowatt of installed capacity, has gone from $319 per kilowatt in 1948 to $344 at the end of 1957. Production plant including transmission has increased from $163 to $193, an increase of over 18 percent. Final data were not available in sufficient detail on plant components to permit extending this and following charts through 1958. Preliminary figures would indicate a flattening out. (Figure 5.)

The economies that the industry has achieved in building power plants containing larger-size, more efficient units are well known. The increase in cost per kilowatt is lower than the price-level increase, as measured by the Index of Construction Costs, over the same period. It is an achievement which in most non-regulated businesses would bring a rewarding return.

Trend of Distribution Investment Per Customer

Distribution plant, including general plant, has increased from $203 per customer to $330 per customer, an increase of over 62 percent. (Figure 6.)

The sizeable increase in investment per customer in this category is attributable to the tremendous area coverage which the industry has achieved in serving customer loads and to the necessity of adding substantial distribution system and investment, primarily due to the requirements of seasonal loads. It is in the distribution system investment that we seek a greater utilization of the invested dollar.

Effect of Inflation on Electric Utilities

What are the effects of inflation on electric utilities? (Figure 7.) The conclusions to be drawn are:

- The costs of new plant in this inflationary era make it imperative that careful scrutiny be given to capital expenditures and their revenue potential.
- The gap between plant and operating revenues will have to be closed, requiring greater sales effort along with the aid of any needed rate changes.
- Return must, in the long run, evidence an improvement in trend. It is not in the nation's best

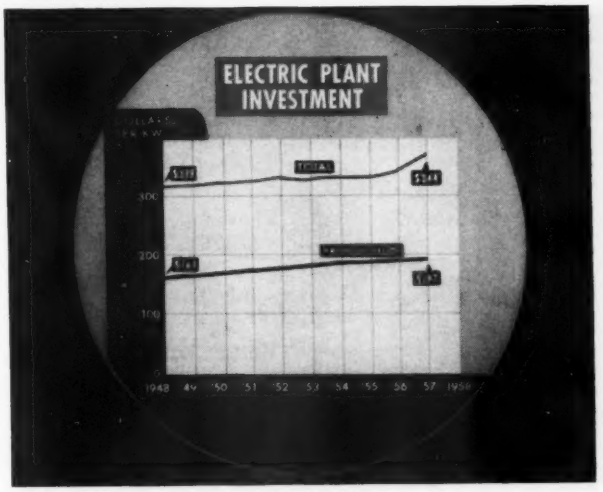

Figure 5

Figure 6

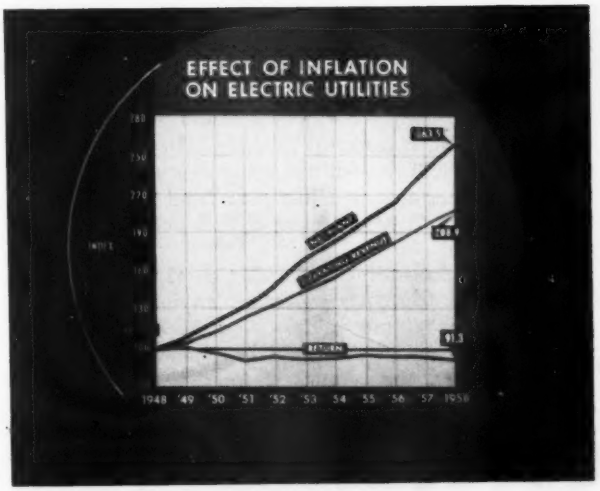

Figure 7

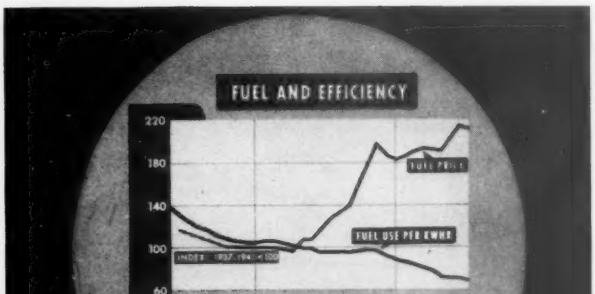

Figure 8

Figure 9

interest to have one of its dynamic basic industries operating on a marginal earnings basis.

Fuel and Efficiency

In the operating areas of production and distribution, and sales promotion, some expense developments will bear consideration in future price policies. (Figure 8.)

A chart, the product of the Edison Electric Institute, tells a very revealing story. It demonstrates how the improved heat rates per kilowatt-hour from the larger, more efficient units have lowered the fuel use per kilowatt-hour. This fact has been primarily responsible for the costs of fuel per kilowatt-hour holding fairly steady in spite of rising fuel prices. The improved generating efficiencies are obtainable only after additional capital has been invested, with additional fixed charges. Two facts now stand out. First, as to fuel use per kilowatt-hour, future technological advances may not produce a decline at the same rate as in the past. And as for fuel price, today's natural gas contracts understandably carry upward escalation. Fuel-oil prices generally keep in line with other competitive fuels. At the moment, future coal prices may be in a relatively better position than the other two major fuels. On the whole, however, it is probable that fuel prices will keep pace with other inflationary trends.

Trend of Operating Expenses

The increased investment in distribution systems has brought with it increased operating expenses. Distribution expense per customer has gone from $11.30 in 1948 to $14.97 in 1957, an increase of 32.5 percent. (Figure 9.)

Customers' accounting and collection expense has gone from $4.27 to $5.75 per customer, an increase of 34.7 percent. Already, much effort has been expended in mechanization and in electronic development. If this had not taken place, the volume of work would have been handled only at much higher unit costs.

The growing loads and expanded use of tomorrow will need a reappraisal of utility sales efforts if customers are to achieve maximum satisfaction in the utilization of the appliance investment we are talking about. Prior to World War II, the industry was spending about 3 percent of its gross revenue on sales promotion expense. In 1948 sales promotion expense of electric companies was only 1.6 cents of each dollar of revenue. In 1957 it was still 1.6 cents of each dollar of revenue. If corrected for inflation since 1948, the industry is spending considerably less for sales promotion effort today when plant investment and competitive forces are at highest levels. (Figure 10.)

$4,000 Appliance Investment

The Gold Medallion Home Program contemplates an appliance investment on the part of the customer of $3,000-$4,000. Now, this is not much more investment, if any, than the homeowner currently is making in a well-equipped home utilizing all of the various utility services. Nevertheless, concentration on all-electric home service, which holds the possibility of being a good earner for the utility, will require an all-out sales effort if it is to succeed. In addition to the Gold Medallion Home Program, there remains the sales task of improving the kilowatt-hour use of 37 million existing homes.

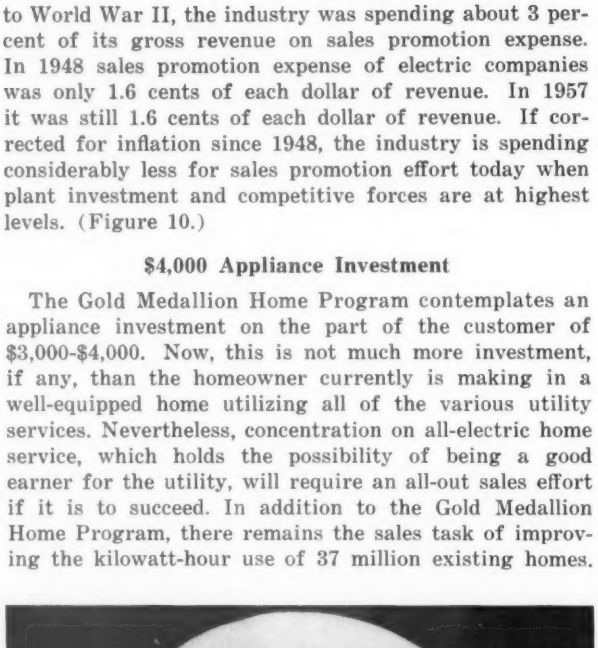

Figure 10

Experience tells us that no matter what the level of rate is, sales results are obtained only as contact is made with the ultimate customer. The old saying is still true that "shoe leather has to be worn out and doorbells have to be rung" if the industry is to make the sales necessary to achieve maximum utilization of the invested dollar. Someone has to ask for the order.

The major conclusions to be drawn from the information listed, as a guide to rate making for the future, may be summed up thus:

- Investment to serve the customer is increasing on a kilowatt and a customer basis. When we take into account the factors of depreciation, insurance and taxes which must go with the direct capital costs, it is evident that the rate structure will have to recognize higher charges on higher fixed investment and, at the same time, be further simplified and made more promotional to permit the sale of service in volume.
- The general increase in operating expenses per customer necessitates a re-examination of front-end charges of the rate structure, including initial charges and minimums, together with a reappraisal of pricing policies as to how far kilowatt and customer charges, which go on regardless of the use of the service, should be spread over the energy charges.
- The past economies obtained through the use of larger, more efficient units which, in spite of constantly rising fuel prices, have resulted in the ability to hold the cost of fuel per kilowatt-hour at existing levels, will need to be reinforced with the added protection of provisions for fuel-price adjustments. It is generally agreed that technological improvements remaining in the future may not be able to always offset the increasing price of fuel.
- Sales promotion expenditures may have to be increased if we are to obtain the maximum customer utilization of and satisfaction with the volume of service he will be receiving. Informed and satisfied customers are a bulwark to investment protection.
- The annual operating costs for all-electric utility service in the all-electric home will require considerable customer education. To achieve this standard of electric living, utility companies should be prepared to offer to customers monthly budget-payment-for-service plans, the same as the customer has available for every other participation that he makes in the American standard of living.
- Research on load utilization and analyses of operations, both on a continuing basis, are no longer a luxury to be enjoyed only by large companies. Today the question is not whether to engage in such work but, rather, how to conduct research activity for maximum usefulness in supplying management with more precise information as an aid to the determinations of company policies and actions.

Regulation

If the forecasts that we have heard here are to be met and companies are to receive fair profits, it will be necessary to take a new look at regulatory policies. The changes to come will have to be evolutionary, perhaps sometimes on an experimental basis. Regulators may well be asked to accept proposals resting on good business judgment and economic principles which may not be susceptible of precise cost accounting proof, at least by conventional methods.

It has been aptly stated that the private utility industry is exposed to all of the economic forces that affect other businesses, and, in addition, the utility business has the added risk of the complexities and political implications of regulation.

I believe that much can be done to improve the utility companies' regulatory relations. We should seek to broaden regulatory contacts and inquiries beyond the accounting control level. We should better inform regulators as to the investment and policy problems that confront companies if customers are to have adequate service under our profit system.

In the recent U. S. Supreme Court decision in the Memphis case, the court took a realistic look at the regulatory problems confronting natural gas companies. The principles set forth by Mr. Justice Harlan, who delivered the opinion of the court, are equally applicable to the operations of electric utility companies that come before regulators for review:

> ". . . Business reality demands that natural gas companies should not be precluded by law from increasing the prices of their product whenever that is the economically necessary means of keeping the intake and outgo of their revenues in proper balance; otherwise procurement of the vast sums necessary for the maintenance and expansion of their systems through equity and debt financing would become most difficult, if not impossible. . ."

Greater Utilization of Fair Value Rate Base

In taking a realistic look at the inflationary conditions of the economic world in which we live today and which will probably continue into the indefinite future, it is axiomatic that regulation must give weight to a utility company's demonstration of a fair value rate base if the utility's rates are to be "just and reasonable." "Just and reasonable," under inflationary conditions, does not mean slavish adherence to the use of historically recorded costs as the sole criterion of value for rate-base purposes. Nor does it mean setting a rate of return a fraction of a point above "bare bones" cost of money.

It has been stated quite frequently that the fair value concept "died" with the Hope decision of the U. S. Supreme Court in 1944. Nothing could be further from the truth. The Hope decision came in the Federal regulatory area at a time when the general price level was not only steady for a long time but far below the inflationary levels that we have today. We must not overlook the fact that today, at state levels, the provisions of state laws are still controlling.

The Montana Supreme Court, in a recent decision, puts it very succinctly:

> "The Hope case is not binding upon the Public Service Commission of Montana. Its action must square with the Montana statutes and the decisions of this Court." (March 19, 1957, 18 PUR 3d 282)

Other courts have upheld this principle.

We have taken a "new look" at what the legislative rights are in the various states. Among the states, including the District of Columbia, the laws in only one of those states (Maine) today specifically prohibit adequate demonstration of the fair value principle.

A study of existing legislation indicates that directives as to value range all the way from ". . . shall consider evidence of present value . . ." through ". . . may consider evidence of present value . . ." to such statements as ". . . . shall consider every fact which in its judgment may or does have any bearing on such value. . ."

It is clear that in those jurisdictions which have such laws but where the commissions still use original cost depreciated as the sole measure of the rate base, such action continues simply because the utilities have been unable to effectively enforce their statutory rights.

Some contend that the utility industry will "do all right" under original cost regulation because so much plant will have been installed in a period of rising prices.

About one-half of our present-day electric plant dollar investment was installed prior to 1950. By then, prices had already risen substantially from levels existing at the end of World War II. Since 1950, electric plant construction costs, on an index base, have increased over 50 percent. From this trend it is evident that only in the case of a static new enterprise, built wholly within the proximity of present price levels, can it be said that original cost and present fair value are reasonably comparable. Furthermore, looking down the road, this will only stay true if we have no further price inflation. The conclusion is inescapable—that spending money at continuing inflationary price levels does not inject fair value into the rate base for all the dollars previously committed at lower price levels.

Somewhere in the original cost depreciated rate-regulation process a large portion of prior investment has been "plowed under" when it comes to producing "real" earnings.

As inflationary developments continue to push prices on upward, a number of decisions this past year have partially come to grips with the facts of present-day economic conditions. In a number of these situations companies had to take their cases to the higher state courts. It is at this level that we have had some reaffirmation of the fact that an objective look can be taken at the economic as well as legal facts of the utility business.

'Forward Rate-Base Approach'

Some commissions are beginning to recognize present-day inflationary conditions by utilization of what I call the "forward rate-base approach." This is a willingness to look beyond the test year. It is an effort on the part of the commission to accord the utility some element of fair value determination which the commission knows the economic realities of present-day inflationary conditions warrant.

Undeniably, forward rate base does give immediately needed revenues. It utilizes the dollars of current or projected plant additions for this purpose. However, it must be recognized that such a determination does not develop a single dollar of fair value for all plant dollars that have been committed to the enterprise at lower than current price levels.

The Iowa Supreme Court, in the now famous Fort Dodge rate case, stated the case for fair value very well:

"The arguments against fair value are all ones of expediency, not ones of justice or fundamental fair treatment. . . ."

* * *

"The fixing of just and reasonable rates must function in a world of change, and must constantly readapt itself to the effect of those changes. . . .

". . . The fact that the problem of valuation for rate making is difficult, however, and the answer not generally subject to precise determination, does not make the problem unsolvable. . . ."

Depreciation Policy

Looking to the future, depreciation accruals will require a re-examination of method and a re-appraisal of policy. As price levels continue upward, the electric industry is faced with some rather simple facts with respect to the adequacy of these accruals.

When utility service is rendered to customers, property employed in that service is being used up. The charges now included in the utility price structure are recovering only the number of dollars originally invested. As inflation continues and the costs of plant construction increase, the dollars recovered through present pricing methods are constantly smaller and smaller dollars in terms of capacity and services that can be bought. The steel people, the automobile people, in fact, all those with heavy long-term investments, are subject to this same relentless effect of inflation.

However, these non-regulated industries are able to keep pace with the changing economic conditions by the ability to change prices quickly. These industries provide for themselves in their price structures an adequate margin with which to keep their property whole. Since the economic facts facing the utilities are no different than those facing non-regulated business, utility pricing and regulatory policy could well contemplate the same protection of a wider earnings margin.

It is no answer to say that the accounting, tax and regulatory problems that would be created by current cost depreciation are "difficult or impossible of solution." Obviously, if utilities were to increase depreciation accruals and still be regulated under the original cost depreciated concept, the result would be even further reduction in rate base. This is all the more reason why the fair value principle should be adhered to.

The first private electric utility to give recognition to fair value depreciation was Iowa-Illinois Gas & Electric Co. Following the dictum of the Iowa State Supreme Court in the Fort Dodge decision, it began booking fair value depreciation in June of 1958. This is an economically sound step both for rate making and accounting.

It is of interest to note that one of the country's large municipal operations is currently accruing depreciation on a fair value basis. The Sacramento Municipal Utility District, in its Annual Report for 1957, states:

". . . In 1957 the District adopted with the full approval of its independent auditors . . . the principle of providing depreciation based on the fair value of its property. In periods of substantial inflation or deflation, because of changes in the purchasing power of the dollar, depreciation based on cost is not a fair

(*Continued on page* 184)

The Challenge of Soviet Power

By Allen W. Dulles

Director, Central Intelligence Agency

THE topic, "Challenge of Soviet Power," is particularly appropriate for the Edison Electric Institute. It was Lenin who defined communism "as the Soviet system plus electrification." The very first Soviet economic plan in the early 1920's had as one of its principal objectives the development of a modern electric power system.

In effect, the Soviets propose to electrify Marxism. What they may in fact do is either to shock their backward political institution into key with their more modernized technical and industrial skills or electrocute the whole archaic Marxist political system.

In any event, the Soviet Union has certainly sought to follow up Lenin's emphasis on electric power and has become a leader in many electronic fields. It has developed intensively the role of radio in its massive effort to promote its subversive policy on a world-wide basis. It uses electricity to jam the airways and to build an electronic iron curtain around the minds of its own people.

In my own business of intelligence, the various manifestations of electrical power are changing the whole system of information collecting in many vital fields. Electricity operates the radar which is on watch against sneak attack. It helps to make possible the ready transmission of warning of impending danger and as the mass of intelligence pours in day by day, over electric channels, it is electronic machinery which becomes a valued partner in helping us in its collation and dissemination.

Soviet Power's Triple Threat

The challenge of Soviet power presents today a triple threat: first, military; second, economic; and third, subversive.

This challenge is a global one.

As long as the principles of international communism motivate the regimes in Moscow and Peiping, we must expect that their single purpose will be the liquidation of our forum of free society and the emergence of a Sovietized communized world order.

They change their techniques as circumstances dictate. They have never given us the slightest reason to hope that they are abandoning their over-all objective.

We sometimes like to delude ourselves into thinking that we are faced with another nationalistic power struggle of which the world has seen so many. The fact is that the aims of the Communist international with its headquarters in Moscow are not nationalistic; their objectives are not limited. They firmly believe, and eloquently preach, that communism is the system which will eventually rule the world and each move they make is directed to this end. Communism, like electricity, seeks to be an all-pervasive and revolutionary force.

Strong Home Base

To promote their objectives they have determined—cost what it may—to develop a military establishment and a strong national economy which will provide a secure home base from which to deploy their destructive foreign activities.

To achieve this objective, they are devoting about twice as much of their Gross National Product to military ends as we do. The USSR military effort as a proportion of Gross National Product is greater than that of any nation in the world. Their continuous diversion of economic resources to military support is without any parallel in peacetime history.

We estimate that the total value of their current annual military effort is roughly equivalent to our own. They accomplish this with a GNP which is now less than half of our own.

Here are some of the major elements which go into their military establishment. The Soviet Union maintains an army of 2.5 million men and the tradition of universal military training is being continued. The Soviet Army today has been fully re-equipped with a post World War II arsenal of guns, tanks and artillery. We have reason to believe the army has already been trained in the use of tactical nuclear weapons.

They have the most modern types of aircraft for defense: night and day fighters, a very large medium bomber force and some long-range bombers. They have built less of these long-range bombers than we had expected several years ago, and have diverted a major effort to the perfection of ballistic missiles.

Their submarine strength today is many times that with which Germany entered World War II. They have over 200 long-range modernized submarines and a like number of less modern craft. They had made no boasts

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 8, 1959.

about nuclear-powered submarines and, on all the evidence, we are justified in concluding that we are ahead of them in this field. We must assume, however, that they have the capability to produce such submarines and will probably unveil some in the near future.

When World War II ended, the Soviet acquired much of the German hardware in the missile field, V-1 and V-2, and with them many German technicians. From that base, over the past 10 years, they have been continuously developing their missile capability, starting with short-range and intermediate-range missiles. These they have tested by the hundreds, and have been in production of certain models for some time.

Ballistic Missile's Role

They also early foresaw that in their particular geographical position, the long-range ballistic missile would become their best instrument in the power struggle with their great rival, the United States. As the size and weight of powerful nuclear weapons decreased, with the improvement of the art, they became more and more persuaded of this. Hence, they have concentrated on these weapons, have tested some and assert that they now have ICBMs in serial production.

They hope in this way eventually to be able to hold the United States under the threat of nuclear attack by ICBMs while they consolidate their position in the fragile parts of the non-communistic world.

Before leaving the military phase of the Soviet threat, I want to dispel any possible misinterpretations. First, I do *not* believe that the Soviets now have military superiority over us; and second, I do *not* believe that they desire deliberately to provoke hostilities with the United States or the Western world at this time. They are well aware of our deterrent force. They probably believe that the risks to them even if they resorted to surprise attack would be unacceptable.

Taking into account our over-all military strength and our strategic position vis-a-vis the Soviet Union, I consider that our military posture is stronger and our ability to inflict damage is today greater than that of the Soviet Union.

Furthermore, we have allies. The strength, the dependability and the dedication of our allies put them in a very different category than the unwilling and undependable allies of Moscow, even including the Chinese Communists.

But as the Soviet military capabilities and their nuclear power grow, they will feel that their foreign policy can be somewhat more assertive.

In 1956, during the Suez crisis, we had the first Soviet missile-rattling as a new tactic of Moscow diplomacy. Since then there have been the Taiwan Straits and Berlin crises, and today the aggressive Communist penetration of Iraq. Hence, we must assume that they will continue to probe and to test us, and they may even support other countries in aggression by proxy. They will put us to the test.

There are two points to keep in mind as we view the military future. Firstly, with a much lower industrial base than we, they are producing a military effort which is roughly equivalent to our own; and secondly, they have conditioned their people to accept very real sacrifies and a low standard of living to permit the massive military building to continue. If the Soviets should decide to alter their policy so as to give their own people a break in the consumer field with anything like the share of their Gross National Product which we as a people enjoy, the prospects of real peace in our time would be far greater.

The new confidence of Khrushchev, the shrewd and vocal leader of the Soviet Communist party, and incidentally head of government, does not rest solely on his conviction that he, too, possesses a military deterrent. He is convinced that the final victory of communism can be achieved mainly by non-military means. Here the Soviet economic offensive looms large.

The proceedings of the recent 21st Party Congress laid out what we might call the Soviet economic order of battle.

Khrushchev explained it in these words, to summarize the 10 hours of his opening and closing remarks:

> "The economic might of the Soviet Union is based on the priority growth of heavy industry; this should insure the Soviet victory in peaceful economic competition with the capitalist countries; development of the Soviet economic might will give communism the decisive edge in the international balance of power."

In the short space of 30 years, the Soviet Union has grown from a relatively backward position into being the second largest industrialized economy in the world. While its headlong pace of industrialization has slowed down moderately in the past few years, it still continues to be more rapid than our own. During the past seven years, through 1958, Soviety industry has grown at the annual rate of 9.5 percent. This is not the officially announced rate which is somewhat larger. It is our reconstruction and deflation of Soviet data.

Our own industrial growth has been at the annual rate of 3.6 percent for the seven years through 1957. If one included 1958, the comparison with the rate of Soviet growth would be even less favorable.

I do not conclude from this analysis that the secret of Soviet success lies in greater efficiency. On the contrary. In comparison with the leading free enterprise economies of the West, the Communist state-controlled system is relatively inefficient.

Secret of Soviet Progress

The secret of Soviet progress is simple. It lies in the fact that the Kremlin leaders direct a far higher proportion of total resources to national policy purposes than does the United States. I define national policy purposes to include, among other things, defense and investment in heavy industry.

With their lower living standards and much lower production of consumer goods, they are, in effect, plowing back into investment a large section of their production, 30 percent, while we in the United States are content with 17 to 20 percent.

Soviet investment *in industry* as planned for 1959 is about the same as United States investment *in industry* during 1957 which so far was our best year.

Although the Soviets in recent years have been continually upping the production of consumer goods, their consuming public fares badly in comparison with ours. Last year, for example, Soviet citizens had available for purchase barely one-third the total goods and services available to Americans. Furthermore, most of the

United States output of durable consumer goods is for replacement, while that of the USSR is for first-time users. In summary, the Soviet economy is geared largely to economic growth and for military purposes; ours is geared largely to increasing consumer satisfactions and building a higher standard of living.

Here are some examples: while the Soviets last year were producing only one automobile for every 50 we produced, they were turning out four machine tools to our one.

This contrast in emphasis carries through in many other fields. Our capital expenditure for transportation and communications is more than double the comparable Soviet expenditure. Yet this is largely accounted for by our massive highway building program which has been running 15 to 20 times the USSR spending, whereas their annual investment in railroad rolling stock and fixed assets substantially exceeds ours.

At the moment, they do not feel much incentive in the road-building field. They have no interest in having their people travel around on a massive scale. Also, this would put pressure on the Kremlin to give the people more automobiles.

Commercial Investment in USA, USSR

Commercial investment, which includes stores, shopping centers, drive-in movies and office buildings, has been absorbing over $6 billion a year in the United States, and only $2 billion in the USSR.

Our housing investment is roughly twice that of the Soviet even though living space per capita in the United States is already four times that of the USSR.

What of the future? In Khrushchev's words, "The Soviet Union intends to outstrip the United States economically. . . . To surpass the level of production in the United States means to exceed the highest indexes of capitalism."

Khrushchev's ambitious Seven-Year Plan establishes the formidable task of increasing industrial production about 80 percent by 1965.

Steel production, according to the plan, is to be pushed close to 100 million net tons. Cement output is set at a level somewhat higher than industry forecasts place United States production in 1965.

The energy base is to be revolutionized. Crude oil and natural gas will constitute more than one-half of the total energy supply, and relatively high cost coal will be far less important than now.

By 1965, the USSR plans to produce about 480 billion kilowatt-hours of electricity. As a study comparing United States and USSR electric power production prepared by a leading industrial research group pointed out, this means that the absolute gap between the United States and USSR in the quantities of electricity generated will increase somewhat in our favor over the next seven years.

This interesting study received a considerable amount of deserved publicity. We agree with its conclusion. However, what is true about electric power is not true across the board, as some commentators concluded.

For example, compare primary energy production trends in the two countries. Soviet production of coal, petroleum, natural gas and hydroelectric power, expressed in standard fuel units, amounted to 45 percent of the United States production in 1958. By 1965 it will be close to 60 percent. The absolute gap in primary energy has been closing since 1950. At the present pace, it will continue to narrow over the next seven years.

Similarly, the absolute gap in steel *production* has been shrinking over the past five years. The maximum gap in steel *capacity* apparently was reached in 1958.

The comforting illusion spread by the "disciples of the absolute gap" should not serve as a false tranquilizer.

At the same time, it is important not to exaggerate Soviet prospects in the economic race. In the propaganda surrounding the launching of the Seven-Year Plan, Khrushchev made a number of statements about Soviet economic power which were nothing more than wishful thinking. Specifically he stated that, "after the completion of the Seven-Year Plan, we will probably need about five more years to catch up with and outstrip the United States in industrial output. Thus," he added, "by that time (1970), or perhaps even sooner, the Soviet Union will advance to first place in the world both in absolute volume of production and in per capita production."

First of all, to reach such improbable conclusions, the Kremlin leaders overstate the present comparative position. They claim USSR industrial output to be 50 percent of that of the United States. Our own analyses of Soviet industrial output last year concluded that it was not more than 40 percent of our own.

Secondly, Khrushchev forecasts that our future industrial growth will be only 2 percent a year. If this is true, the United States will be virtually committing economic suicide. This prediction I regard as unrealistic.

A saner projection would place 1965 Soviet industrial production at about 55 percent of our own. By 1970, assuming the same relative rates of growth, USSR industrial output, as a whole, would be about 60 percent of that in the United States.

Khrushchev's Nonsense

Further, when Khrushchev promises his people the world's highest standard of living by 1970, this is patently nonsense. It is as though the shrimp had learned to whistle, to use one of his colorful comments.

These Soviet exaggerations are a standard tool of Communist propaganda. Such propaganda, however, should not blind us to the sobering implications of their expected economic progress.

First of all, rapid economic growth will provide the Kremlin leaders with additional resources with which to intensify the arms race. If recent trends and present Soviet policies continue, Soviet military spending could increase by over 50 percent in the next seven years without increasing the relative burden on their economy.

Secondly, some additional improvement can be made in the standards of living of the Russian people, even with continued emphasis on heavy industry and armaments. It is only since the death of Stalin in 1953 that serious attention has been given to improving living standards. The moderate slow-down in the headlong growth of heavy industry which then ensued has been caused, in large part, by the diversion of more resources to housing, to agriculture, and to consumer goods.

Living standards, based on present Soviet plans, are expected to increase about one-third over the next seven

years. This level, if achieved, will still be far below that which our own citizens are now enjoying, but it will look good to people who for long have been compelled to accept very low standards.

Finally, the Soviet Seven-Year Plan, even if not fully achieved, will provide the wherewithal to push the expansion of trade and aid with the uncommitted and underdeveloped nations of the Free World. By 1965 Soviet output of some basic raw materials and some industrial products will be approaching, and in a few cases exceeding, that of the United States, Most prominently, these products will be the kind that are needed for industrialization in the less developed countries.

Free World's Survival at Stake

The outcome of this contest—the Communist challenge in underdeveloped areas—is crucial to the survival of the Free World.

This is an unprecedented epoch of change. Within little more than 10 years, over three-quarters of a billion people, in 21 nations, have become independent of colonial rule. In all of these newly emergent countries, there is intense nationalism coupled with the determination to achieve a better way of life which they believe industrialization will bring them.

The leaders of world communism are alert to the opportunity which this great transformation provides them. They realize the future of communism can be insured only by expansion, and that the best hope of such expansion lies in Asia and Africa. While they are attempting to focus all our concern on Berlin, they are moving into Iraq with arms, economic aid, and subversion, and giving added attention to Africa.

The Communist bloc trade and aid programs in underdeveloped countries moved into high gear during 1958. The equivalent of over $1 billion in new credits was extended to underdeveloped countries by the bloc in this year. In the four-year period ended in 1958 the total of grants and credits was $2.5 billion, of which $1.6 billion came from the USSR and the balance from the satellites and China. Three-fifths of the total delivered to date has been in the form of arms to the UAR—Egypt and Syria—Yemen, Iraq, Afghanistan and Indonesia. These same countries, plus India, Argentina, Ceylon, Burma and Cambodia, have received the bulk of the economic aid.

Over 4,000 bloc technicians have been sent to assist the development of nations in the Free World. About 70 percent of these technicians are engaged in economic activities. Others are reorganizing local military establishments and teaching bloc military doctrine to indigenous personnel.

The bloc also has a well-developed program for training students from underdeveloped countries. About 3,200 students, technicians and military specialists have now received such training behind the Iron Curtain.

While these figures are still well below the total of our own aid, loan and training programs, this massive economic and military aid program is concentrated in a few critical countries and, of course, these figures do not include Soviet aid and trade with the East European satellites and Communist China.

India, which has received over $325 million of bloc grants and credits, is a primary recipient. The Soviet economic showplace there is the Bhilai steel mill, being built by the Russians. The UAR over the past four years received over $900 million in aid and credits. This investment today does not seem quite as profitable to the Soviet as it did last year.

Iraq provides a prime example of the opportunistic nature of the bloc's aid program.

Prior to the coup d'etat on July 14th last year, Iraq's economic involvement with Communist nations had been negligible. In the past few months, the USSR has provided over $250 million in military and economic development credits. The Iraq Development Board has dropped its two Western advisors. Western technicians are also being dismissed and contracts with many Western firms cancelled. Increasingly, Moscow is pressuring the Iraq government to accept dependence on Communist support and the number of fellow travellers in high government posts is growing.

The Soviet policy of economic penetration fits like a glove into their world-wide campaign of subversion, which is the third main element of the triple Soviet challenge: military, economic and subversive.

International communism has not changed its operating procedure since the days of the Comintern and the Cominform. The Communist party of the USSR, of which Khrushchev is the leader, is the spearhead of the movement. It has a world-wide mission, formulated by Lenin and Stalin and now promoted by Khrushchev, but with more subtle techniques than those of Stalin. This mission continues to be the subversion of the entire free world, starting, of course, with those countries which are most vulnerable.

Its arsenal of attack is based, first of all, on the Communist parties of the Soviet Union and Communist China. These, in turn, direct the hard-core Communist organizations which exist in practically every country of the world. Every Communist party maintains its secret connections with Moscow or, in case of certain of the Communist parties in the Far East, with Peiping.

These parties also have an entirely overt association with the international Communist movement. At the 21st Meeting of Soviet Party Congress, there were present representatives of some 60 Communist parties throughout the world, including two representatives of the United States Communist party. The single theme of these Communist leaders was their confidence in the eventual world-wide triumph of their movement.

Worthless Agreements

From time to time Moscow has made agreements, such as the Litvinov Pact in 1933, not to interfere in the internal affairs of other countries. On the strength of this we resumed relations with the Soviet. They are eager to conclude like agreements of "friendship and non-aggression," with all countries of the world. These are not worth the paper they are written on. During World War II, Moscow abolished the international Comintern to propitiate the United States, its then wartime ally. Its functions have, however, been carried on continuously under other forms.

In addition to its world-wide penetration through Communist party organizations, the Communists in Moscow and Peiping have set up a whole series of front organizations to penetrate all segments of life in the free countries of the world. These include the World

Federation of Trade Unions, which claims some 90 million members throughout the world. International organizations of youth and students stage great festivals at frequent intervals. This summer they are to meet in Vienna. This is the first time they have dared meet outside of the Iron Curtain.

They have the Women's International Democratic Federation, the World Federation of Teachers Unions, the International Association of Democratic Lawyers; Communist journalists and medical organizations. Then cutting across professional and social lines, and designed to appeal to intellectuals, the Communists have created the World Peace Council which maintains so-called peace committees in 47 countries, gaining adherents by trading on the magic word of "peace."

To back up this massive apparatus, the Soviet has the largest number of trained agents for espionage and secret political action that any country has ever assembled. In Moscow, Prague and Peiping and other Communist centers, they are training agents recruited from scores of other countries to go out as missionaries of communism into the troubled areas of the world. Much of the Middle East and Southeast Asia, and particularly Black Africa, are high on their target list. They do not neglect this hemisphere as recent disclosures of communism into the troubled areas of the world. Much purpose is to destroy all existing systems of free and democratic government and disrupt the economic and political organizations on which these are based. Behind their Iron Curtain they ruthlessly suppress all attempts to achieve more freedom—witness Hungary and Tibet.

Slogans, Economic Conditions

The task of destruction is always easier than that of construction. The Communist world, in dealing with the former colonial areas and the newly emerging nations of the world, has appealing slogans to export and vulnerable economic conditions to exploit. The fragile parliamentary systems of new and emerging countries are fertile ground for these agitators.

Also under the heading of subversion we must not overlook the fact that the Communist leaders have sought to advance their cause by local wars by proxy—Korea, Vietnam, Malaya are typical examples.

I wish to emphasize again the pressing need for a clearer understanding of the real purpose of the Sino-Soviet program. There is no evidence that the present leaders of the Communist world have the slightest idea of abandoning their goal, or of changing the general tactics of achieving them.

Those who feel we can buy peace by compromise with Khrushchev are sadly deluded. Each concession we give him merely strengthens his position and prestige and the ability of the Soviet regime to continue its domination of the Russian people whose friendship we seek.

Our defense lies not in compromise but in understanding and firmness, in a strong and ready deterrent military power, in the marshalling of our economic assets with those of the other free countries of the world to meet their methods of economic penetration, and in the unmasking of their subversive techniques.

The over-all power of the free world is still vastly superior to that under the control of the leaders of international communism. If they succeed and we fail, it will only be because of our complacency and because they have devoted a far greater share of their power, skill and resources to our destruction than we have been willing to dedicate to our own preservation.

They are not supermen. Recently they have made a series of blunders which have done what words could not do to help us unmask their true intentions. These very days Communist actions in Iraq and Tibet have particularly aroused Moslems and Buddhists against international communism. The institution of the so-called "communes" system on the China Mainland has shocked the free world and even the Soviet leaders apologetically refuse to endorse it.

Despite the problems surrounding the Berlin issue, Western Europe is stronger than it ever has been since World War II. Much of Free Asia and the Middle East is becoming alerted to the true significance of communism.

The outcome of the struggle against international communism depends in great measure upon the steadfastness of the United States and its willingness to accept sacrifices in meeting its responsibility to help maintain freedom in the world.

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Pricing Policies for Tomorrow

(*Continued from page* 178)

measure of the property consumed in operations. This principle of accounting, sometimes referred to as 'price level depreciation,' recognizes that a utility should collect in revenues an amount to cover the fair value of its property consumed in operations if the real capital dedicated to the business is to be maintained."

Organizing for the Pricing Job Ahead

When full and adequate consideration is given to some of the items we have covered, it is evident that the determination of pricing policies for tomorrow is one of the most important matters that will confront utility company managements.

Primary responsibility, of course, rests in the hands of the chief executive. But practical operation demands that this responsibility should, in our opinion, be delegated to a staff organization responsible to the chief policy-making executive.

The responsibilities to be delegated are:

- To develop the rate structure that will produce, on a continuing basis, the growing revenue requirements of the company.
- To administer the rate structure in such a manner that the regulatory standards controlling the utility will be adequately met and good business relations with customers will be maintained.
- To represent the company before regulatory commissions and similar groups on all matters of rate interest.
- To conduct research on loads and analyze operations so that more precise information will be available for policy decisions rather than generalized opinions.
- To keep the management group, of which rate and economic research should be an integral part, well informed on rate regulatory and economic matters at the local, state and national levels.

The utility business, as to its own operation and in its public contacts, is becoming vast and complex. No longer is it feasible for the chief executive officer to be his "own rate man" as many of you gentlemen have done in the past. The time is ripe for a constructive appraisal of your organizational set-up for the job ahead.

Much progress has been made in many companies. Much more remains to be done if the electric utilities are to handle prudently and price adequately the tremendous service demands of customers, and at the same time make a fair profit for investors.

Are Women Important in Your Life?

(*Continued from page* 122)

It is apparent that your industry is opposed to the bills now pending in Congress concerning TVA.

You say that:

- They permit virtually unlimited expansion of the TVA service area.
- They introduce a new fiscal device to finance Federal activity that by-passes traditional congressional controls.
- They repeal fiscal controls, including treasury department control over the issuance of bonds.
- The extend from 40 to 120 years, TVA's required payment for the $1.2 billion appropriation invested in TVA power facilities.
- They allow TVA to pay a lower rate of return on the appropriation invested than the government itself must pay on its own long-term obligations.
- They provide for no repayment or even a return on an additional $470 million government investment in power facilities.

What Government Would Control

If the government ever controls our total power output, it will exercise control over the greatest labor-saving, health-giving, entertainment power in all the world.

I can't bring myself to believe that women are not interested in who owns and runs their electric light and power company in their own town. If they are at all community-minded, they know that the light and power company is the number one citizen in the town; that its officers are always ready to help them in any community project with money, with time, with genuine interest. The light and power companies know full well that what is good for their towns is good for them. These companies should have an officer or department in charge of politics, preferably a woman.

Work with Women

Somehow or other, you must get over to the women stockholders that you are there not only to provide electric service, but also to stand alongside them in any effort that they undertake that genuinely promises to improve the local community. Don't be afraid to take the time to work and argue this out with them for it will pay off.

Someone has said: "He is my friend who stings me into action." You are not unaware of what is going on and much has been said, but the cancerous growth of government in business is going on behind the scenes. As a small town woman banker, I can do only a little; but I believe the role of woman, as customer, stockholder, employee and as mother in a household that has wonderful opportunities under a free enterprise system, is one of undeniably great power.

Corette Says Industry Wives Are Not Properly Informed

EEI President Addresses Ladies Luncheon at 27th Annual Convention

MEN in the electric utility industry are not informing their wives about the facts that are important to the future of America and to the future of the industry, J. E. Corette, President of Edison Electric Institute, declared at the EEI-sponsored Ladies Luncheon during the Institute's 27th Annual Convention in New Orleans, April 7.

Children's Future in Jeopardy

Mr. Corette warned the ladies that the future opportunity and happiness of their children were in serious jeopardy. "I am completely convinced from what has happened in America in the last 25 years and from what is happening now, that the trend will continue unless ladies like you become interested and aggressively and vitally active in all types of economic and political information and activity," Mr. Corette said.

His remarks follow:

A deep-rooted philosophy of mine is that every wife is a partner of her husband; that she shares his plans, his problems, his future, and his work; that in connection with his work—which is just as important to her as it is to him—she occupies a back seat; that in some fields her talents exceed his and that they are wasted by not educating and informing her and by not putting her to work at the job which today is the most important one every American has.

The Most Important Interest

The mother's interest in the future of her children has been her greatest and most important interest in life. The father may take great pride in the progress and success of his children, but from the first moment a new baby is placed in a mother's arms, the mother does more for it, worries more about it and thinks more about it than anyone else in life.

The future opportunity and happiness of your children are in serious jeopardy. Under these circumstances, I believe you ladies do not want to hear trivialities when you could hear facts you can use to improve greatly the happiness and the success of your children and grandchildren in the next 25 to 50 years.

I am completely convinced from what has happened in America in the last 25 years and from what is happening now that the trend will continue unless ladies like you become interested and aggressively and vitally active in all types of economic and political information and activity.

I am convinced that we men in this industry are not doing our job of informing the wives and that the wives are not doing their job of getting informed and of informing all of the people they contact about facts that are important to the future of America and our industry.

We have just had a dramatic demonstration of my point. The last speaker on this morning's program was United States Senator Barry Goldwater of Arizona. No man in America has been more courageous or has advocated and more strongly expressed to the people of his state and to the people of America the basic principles in which we believe and on which America has developed and prospered. Barry Goldwater, as a great American, has earned the support and the respect of the people of America.

Invitation to Ladies

To hear Senator Goldwater is an education for every good American and a real privilege. As I introduced and later thanked Senator Goldwater this morning I noticed with real disappointment that there were only eight or ten ladies among the approximately 1500 people in the audience. As I look at this enormous Ladies Luncheon of approximately 1200 ladies, I promise you that I will exert my extreme efforts to see that at future conventions you ladies will receive a special invitation to all the speeches, information as to those speeches which are non-technical and will be of particular interest to you, and that we have an assembly hall large enough to accommodate you.

I fear that you feel that I am lecturing you and that you may seriously dislike it. However, the matter is vitally important. You ladies are one of our industry's greatest assets. If by these remarks and their aftereffects we succeed in utilizing this valuable asset, I will have accomplished something important for you, for America and for our industry.

America: Example of Freedom

Today, America stands as the world's outstanding example of freedom. In this country a person can own and operate any business he likes. He can work at any job he likes in any part of the country he likes. He can retain any profits or savings which he honestly makes. He has the many protections that result from our Constitution and our Bill of Rights, such as freedom of speech, freedom of religion, the right to own and keep property, and freedom from search and seizure.

America is great today because we have freedom and

the world's greatest productivity per hour of work. We are losing both by a constant and rapid drift towards more government in business, more Federal aid of all kinds, more government control, and higher Federal budgets and higher taxes.

Where does it all lead? I'm sure your husbands will tell you from very sad experience that Federal aid means Federal control.

Difference Between USA and USSR

The difference between two opposite systems—government ownership and control as in Russia, and freedom, private ownership and control as in the United States—is demonstrated by the following:

The United States, with 1/16 or only 6 percent, of the world's population and occupying only 1/16 of the world's surface, has three-fifths of all the automobiles, one-half of all the telephones and radios and two-thirds of the television sets in the world. The United States consumes three-fifths of the world's oil, one-half of its coffee and two-fifths of its electricity. United States factories produce one-half of the world's goods.

In the United States a worker can buy a dozen eggs with 18.6 minutes of work; in Russia it takes 131.1 minutes.

America is recognized as the richest nation on earth. In America 98 percent of all work is done by machinery. During the past 100 years the national income per man-hour worked has risen directly in proportion to the increase in horsepower hours per manhour worked. In other words, the more machinery a man has the more he can earn in real income.

America has developed this machinery and this productivity by encouraging individual Americans to save so that they can invest their savings in companies that produce things people want. It is the profit system which encourages men to save and invest so they can have more and produce more.

This system is capitalism. It is far better than socialism.

Danger Signals Seen

There are some danger signals which I see. The Federal budget has increased from $13,262,000,000 in 1941 to $80,871,000,000 in 1959. There are 20,000 government-owned, commercial businesses. There has been an enormous growth of partially tax-exempt businesses. For example, the business of co-ops has increased from $2 billion to over $13 billion per year in the last 25 years. Products of foreign manufacturers are invading our American markets in many fields and are becoming a serious threat to many American businesses.

Who is to blame?

Who is responsible for this change that is taking place in America?

My answer is the business people of America are responsible because we do not take a sufficiently active interest in politics. We have looked down on politics and politicians. We have not given our support and the active help to political officials who deserve it. We have not opposed strongly enough those whose philosophies would change our American system.

'Lack of knowledge of economic facts is the basic cause of radicalism in America.

Research indicates that people who are informed regarding economic facts have a philosophy of individualism and conservatism. People misinformed or poorly informed on economic facts have a philosophy of collectivism or socialism.

The answers to the following questions are indicative. Would the American people want the government to operate the economy? Are the people in favor of government operation of banks and big industries? Would the American people want the government to guarantee jobs for all?

In a test among people known to have socialistic leanings these questions were answered "yes." The same questions, asked of people known to believe in free enterprise, or freedom, were answered "no."

People who know the actual facts in connection with government in business oppose collectivism and government paternalism and want to preserve the present American system.

Something Better Wanted

Why do people want to change this system?

Basically, it is because they want something better. Surveys show that the people who believe that more socialism and paternalism is better, base this conclusion on erroneous facts, such as: profits are too high; the owners of a company get too big a share. This is because when asked what the average profit is in industry during a recent survey, people usually answered 25 percent, with 10 percent given as the average answer for fair profit. Actually, profit that year was about 5 percent, or one-half of what people thought was fair and one-fifth of what they thought the profit was.

Because of this type of belief, based on erroneous knowledge, people like that want the government to control the rate of profits; the government and the unions to get them a bigger share of the income; and government aid in other fields.

What are the basic foundations under American prosperity?

They are, among others, the following: private property, a free market, profit and saving incentives, competition, government regulation, not government operation.

Motivations to work can be divided into two groups: you can force people to work, or you can reward them for working.

In America we choose reward.

Today's world has outstanding examples of the results of the two systems as follows:

- The great productivity of America in agriculture and industry compared to the low productivity of Russia.
- The remarkable development of Western Europe compared to the lack of development of the Iron Curtain countries.
- The failure of socialism in Great Britain.

Ladies More Persuasive

Ladies can do more than men in this situation. Your words are more persuasive. You have at stake the future of your children and your grandchildren.

You have more time and you see more people than men do.

The future of America is in your hands.

We Are Neglecting Our Greatest Asset

By J. K. Busby
President, Pennsylvania Power & Light Co.

WHENEVER we appraise our industry's future, we soon come to a central theme—the prime need that we have for an informed and favorably inclined public.

As we look over our public relations posture we can see at hand great sources of potential strength and support. We have the good fortune to serve some 37 million residential customers. Although our corporate balance sheets show a plant account of $39 billion, it is these customers who comprise our greatest asset. We are in the same position as every American business—there is no such thing for us as a captive customer. Like the equipment manufacturer and the grocery store, customer acceptance is the determinant of our future.

We might well say we are thrice fortunate. For our 37 million customers, with their families, open the door to us to earn the support and confidence of 124 million people.

Also, excellent additional opportunities to win an increased measure of public esteem are available through better understanding and support by our many shareowners. This can be an influential group, for our shareowners with their families, number at least 10 million people.

And there is much we, ourselves, can do to aid our own cause. With our families, those of us who work for utility companies account for probably a million people.

Clearly, we have a vast potential for broad-based support. On top of this, we can properly say that our employees and the investors in our companies have been fairly compensated for their contributions to the enterprise.

Especially, we can say that we have done a good job for our customers.

We have built and financed new and modern facilities to provide power without limitation for the country's growing economy, including defense demands. For our residential customers, all the electricity they wanted for added convenience and comfort in their homes was always available at the flick of a switch. (Figure 1.)

During a period of sharply rising prices, electricity for the home has been an increasingly better bargain. (Figure 2.) At the same time, our companies have upgraded substantially the quality and reliability of service.

On this performance it is reasonable to expect that we would have gained wide public support for our industry. The unpleasant and galling fact is that tested by some important measures, our public acceptance has been retrogressing.

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 8, 1959.

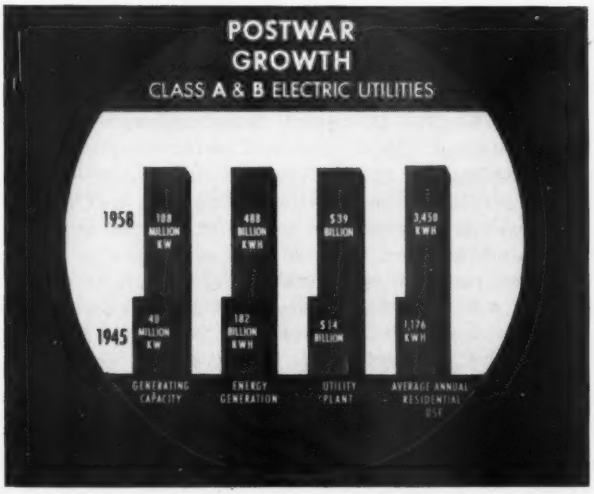

Figure 1

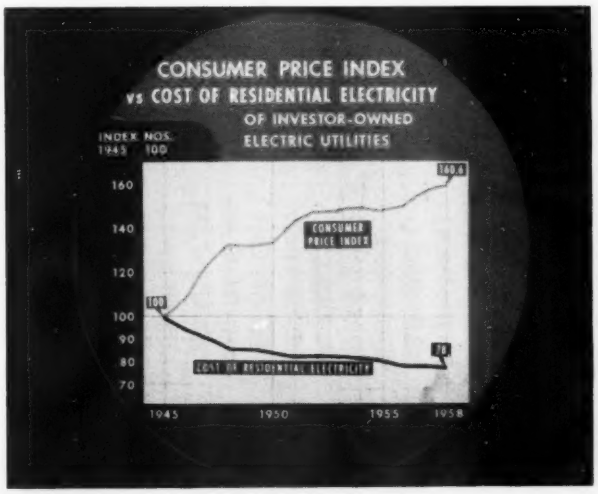

Figure 2

Measure No. 1 is the adverse trend of utility generation of power, *not* produced by our companies. The 40.7 billion kwhr in 1945 were 18 percent of total energy generation for utility purposes. With continuation of the ratio existing in 1945, the non-company generation in 1958 would have been 110 billion kwhr. In fact, it was 156.9 billion kwhr, representing 24 percent of the total as compared with only 18 percent in 1945.

Measure No. 2 is the adverse trend in number of residential and rural customers served by *non*-company utilities. In 1945 there were 4.6 million of these customers. With continuation of the 1945 ratio, such customers in 1958 would have numbered 7.5 million. *In fact*, they numbered 10.4 million. The differential is 3 million customers in the wrong direction—a disturbingly large swing. On a household basis, this means that today there are 10 million people who are not served by our companies because of the deeper inroads of public power.

We know the Federal legislation which is at the root of these trends. And we have good reason to doubt that it has popular understanding or support. Yet Congress, over the past several years, has continued to pass laws which put the government more and more into the power business.

Little Opposition

There has been relatively little active opposition to this trend expressed by the general run of our customers. For the most part, they have stayed on the sidelines—due to their lack of knowledge and their lack of interest. For this state of affairs we must accept responsibility. The unwelcome conclusion that comes to mind is that these conditions are present because in some manner we are neglecting our greatest asset—our customers. This we cannot permit. Our customers hold our future in their hands. To survive and grow, we must have their active support.

However, we must be realistic enough to recognize that when we tell our story about industry issues, our customers are quite apt to view it as a request for *their* help to further some interest of *ours*. Under these circumstances, there is the likelihood of a lukewarm reception.

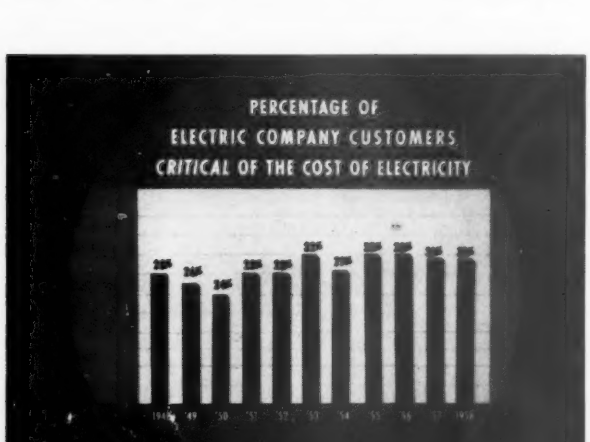

Figure 3

To obtain the listenership of our customers, and thereby open wider the door for understanding and acceptance of our industry position, we must get across to our customers that *we* are protecting and advancing *their* interests. These millions of customers of ours are the public. They must be satisfied that our utility companies are being run *first and foremost* for the benefit of the customer. They must be satisfied that the system of private ownership under regulation is *their* best bet. This is the image we must get across. And there is only one way to do it—by performing in accordance with this image in every phase of our business, every day of the year, year after year. No matter how much we are now doing in this respect—and every company is doing a great deal—we must do more.

It will be possible to know when we are doing enough. When our performance has better established in the minds of our customers that *we* are effectively serving *their* interest, more of *their* support will be forthcoming and there will be an end to further inroads by government power.

We have some tough road blocks to overcome. Based on customer opinion findings made for PIP by Central Surveys, 11 percent of the customers served by *our* companies do not know who they are served by—whether by us or by some public power agency. This 11 percent indicates that 4 million of our customers—13 million people on a household basis—are lost in a limbo of inadequate information. As another example, in this same survey on electric power issues, when respondents were asked what they understood was meant by the phrase, "Company Ownership," one-third said they did not know. But this is not all.

21 Percent Misinformed

The same survey reveals the shocking fact that across the United States 21 percent of *our* residential customers believe that they are served by public power, either a Federal, state or municipal agency or co-op. This is equivalent to 7.8 million of *our* customers, comprising with their families some 26 million people, who believe they are served by public power.

The survey shows that the percentages range from a high of 35 percent in the East-South Central region to a low of 14 percent in the Mid-Atlantic region. The East-South Central region includes TVA, and this points up the confusion that can be caused by a public power concentration in an area.

Further analysis by Central Surveys gives us a good idea where our attention should be directed in order to eradicate these areas of ignorance. Having in mind the 21 percent misinformation figure that was shown for the United States as a whole—the women were 31 percent misinformed, twice as much as the men; persons under 30 years of age were 40 percent misinformed, twice as much as older persons; and at the lowest level of income the misinformation was 28 percent as compared with 16 percent at the highest level.

An important element in this widespread misinformation is our industry's extensive use of state and city names in our corporate names. Many of our customers are thereby influenced to think they are supplied by a state or municipality.

There may be a temptation to believe that it must be

the customers of the other fellow's company who are misinformed. If we yield to this temptation, the figures in this chart will not change. But if each of us will check up on himself and take action to improve the situation in his area, we can be back at another EEI Convention before too long and look at a new chart with this percentage of 21 percent reduced to 10 percent, and then reduced again to 5 percent. And let's not forget the 11 percent of our customers who do not know who they are served by. Through correcting these two situations, we can gain millions of new friends for our industry.

There is another and tougher road block that deserves top attention. This is that some 31 percent of our customers are critical of the cost of electric service. They believe our rates are higher than should be. However much we would like to, we cannot afford to brush off this high degree of criticism on the ground that it is merely a normal response to the inflationary price spiral (Figure 3.)

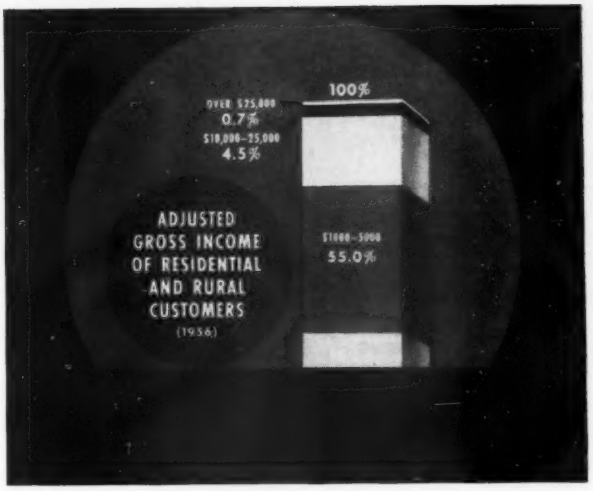

Figure 4

Trend Up, Kwhr Cost Down

As we all know, the average cost of the kilowatt-hour for the residential customer has been steadily lower, dramatically contrary to the general rising price trend. In view of this, any so-called "normal" criticism of the price of electric service is itself proof that our customers are not aware of this lower unit cost and are not giving our industry any credit for making it possible. This unawareness exists broadly among all customer groups to about the same extent regardless of age, sex, or income.

Another reason why we cannot afford to dismiss lightly this high percentage of price criticism is because of the implication that it holds for our future. Analysis has been made of customer attitudes on cost of electric service in relation to attitudes for and against public power. There is a striking parallelism. Customers who are critical of the cost of electric service tend to be favorable to public power. On the other hand, customers who understand their electric bills tend to favor the business-managed utilities.

Continually, we should have in mind the conditions which directly affect the great number of our customers. As appears in Figure 4, 55 percent of our customers have an adjusted gross income of $1,000 to $5,000 a year or less. For two-thirds of our customers, $5,000 is the top. Understandably, in this group there is not going to be much time or inclination to consider philosophy of government. The main concern is the problem of making a living. The large number of these customers will not be reached through Chamber of Commerce meetings or luncheon speeches at service clubs.

Also, we should have in mind the relationship between the average bill of our residential customers and the amount of their personal disposable income. In 1945, the average annual bill was a little over $41. In 1958, it was over $83, or more than double what it was in 1945. In 1968, 10 years hence, the average bill should reach $150. From the chart, it is quite apparent that the average electric bill has been increasing faster than personal disposable income—in the years ahead, with successful selling, this trend will be accelerated. This sort of situation can easily produce customer irritation and criticism of price. When the average bill reaches $150, a lot of bills will be much higher. For the all-electric home, the added cost for space heating alone may, in many cases, be in excess of $300, and in some cases $400 or more. Unless we carry out our selling in a thoughtful and informative fashion, a bi-monthly bill in wintertime may produce some very hot customers.

It is high time we got down to brass tacks and begin to explain these higher bills in terms that can be understood by our customers. Certainly more extensive value-of-service advertising is indicated. But to be meaningful, such value-of-service advertising must be repetitive and done on a long-term basis year after year. All our employees and their families must know the value story and be salesmen in this regard. It is up to us to get across to the customer that he is the one who sets the size of his electric bill. He is free to make it large or small. It is not something which is imposed upon him by the utility company.

To Forestall Criticism

The interesting suggestion has been made by Robb Winsborough in a recent article in *Public Utilities Fortnightly* that utilities should take the initiative in interviewing a regular sampling of customers with good-sized bills and explain to them the make up of their cost of electric service. This practice might serve to forestall criticism in the very areas where it is most apt to occur. Also, if correlated with customers who are opinion leaders, it might help to broaden public understanding of the actual low cost of electric service. Undoubtedly, other approaches are possible and available. What we have to do is to try out approaches like this, regularly test the results, make changes as necessary, and stay at the job until we can obtain measured improvement.

As a part of reducing the undue level of criticism of cost of electric service, we should clear out of the way some existing prejudices that interfere with customer confidence in utility companies.

There is the familiar allegation that utility managements are primarily concerned with earning a profit for their shareowners and thus the customer comes off

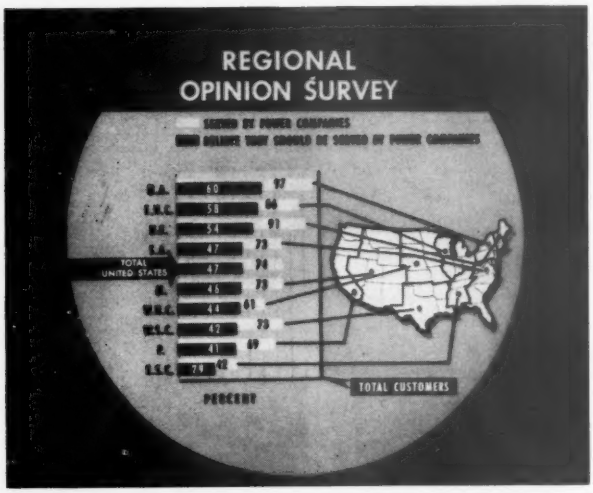

Figure 5

second best. This is a ghost that must be laid to rest. It is a point that is made against us frequently and, by default, is acquiesced in by many.

Of course, profit in our business is a part of the cost of service and this cost is in its entirety a regulated cost. We must do more to gain understanding of this by our customers and, at the same time, convince them of the complete compatibility of interest between investor and customer. In discussing the familiar utility triangle, defining the three essentials of our business as the employee, the investor and the customers, let us be sure that our customers know that *we* know that the customer is the *base* of that triangle.

Attitude Towards Regulation

We also need to eliminate false notions about our industry's attitude towards regulation. Here we need to be outspoken in our support of strong and independent regulatory agencies, staffed by competent and well-paid personnel. We should make sure that our customers understand we do not shy away from regulation. During periods of prolonged inflation, rate proceedings necessarily occur. Often they are abrasive. Nonetheless, they should be looked at from the standpoint that they enable us to render a public accounting of our stewardship and to demonstrate the management capabilities that we have brought to bear to hold down the cost of service.

There is undoubtedly a relationship between maintaining public confidence and providing opportunity for public hearings and airing of the facts. Such hearings provide customers with a healthy and necessary escape valve. Further, we thereby have opportunity to emphasize another major difference between ourselves and the government power agencies who are not subject to regulation or direct accountability to their customers.

How Customers View Public Power

Figure 5, based on Central Surveys findings, sums up the end result of customer attitude on the public power issue. It shows the percentages of the national total of all residential customers, including those served by our industry, by government agencies and by co-ops, who *think* that a utility company *should* supply electric service.

Underlying these figures is the fact that in *every* region, a *majority* of our customers favor continuation of service by our companies. But as the chart shows, we are also faced by the fact that in only three regions—Middle Atlantic, East North Central and New England—is there a majority of the *total* customers favoring service by our companies.

The figure for the United States as a whole is 47 percent of total customers in favor of utility company service, with 13 percent of *total* customers having no opinion.

So we have a situation where a high percentage of our customers doesn't know who we are, a high percentage is critical of the cost of electric service and a high percentage is passive or opposed on the ultimate question of whether our companies should supply electric service. Not a good situation, to say the least.

Recall that overall, 21 percent of *our* customers thought they were served by some public power agency. Special analysis of this group discloses they were 79 percent *for* public power. Recall also the 11 percent of our customers who did not know whom they were served by—in this category special analysis shows that 40 per cent were for public power.

There is every reason to believe that the adverse opinions held by our customers in these two categories would substantially and dramatically change around in our favor—*if only they knew they were served by our companies.* The evidence is convincing when our customers know it is we who serve them; they are on the average 75 percent on our side on the public power issue.

We have the potential, therefore, through the most basic kind of additional information to our customers, to raise to a clear majority the present 47 percent favorable opinion shown on the chart for the United States as a whole. By hard and effective work we have the further capability of enlarging this clear majority. But even this will not be enough. Our basic need will still continue to be the *active* support of many people, particularly the active support of large numbers of our customers.

What each company should do is, of course, for it to decide. In our company we have determined, because of the facts that have been laid before you here, to take action along these lines:

- Review and change our organizational setup as necessary to ensure that there is central and unified direction of all of the interrelated aspects of customer relations, employee relations, investor relations and community relations, which in the aggregate influence and make up our public relations.
- Be more aggressive in explaining to our customers how and why it is that *their* interests are being well served.
- Inventory the sum total of all our many contacts with our customers; review these on a functional basis to determine whether they are being handled to best advantage from the customer standpoint and to determine also whether our customers know, as well as they should, who is serving them. Take the initiative in work-

ing out new methods and changes in present procedures, then test customer response by opinion surveys.

- Expand our information to our shareowners, and explain more fully our need for their support. Conduct regular annual regional shareowner meetings, encourage large attendance, and use these meetings to bring management to our shareowners and customers under circumstances where there is an excellent climate for improved understanding and exchange of information. Measure by survey what we are accomplishing.
- Conduct more extensive programs of employee information, discussion and training. Our employees are the key to winning better customer attitudes as well as achieving lower-cost operation. Currently we set aside many thousands of employee hours every year to do this job. We are raising this amount by 75 percent. Again, we will use surveys to determine what progress we are making.
- Hammer away at tax inequality at all levels and with all audiences. In so doing, tell the story of the American economic system—the freedoms and opportunities it provides, what we pay for them and why they are worth the price. And lay on the line that action is needed now to preserve this heritage for our children and grandchildren.
- On every occasion possible, stress the broad picture of overall *industry* accomplishments. We know that good public relations for our individual companies are not enough. There must be good public relations for the entire industry. Without strong public acceptance for the industry, individual merits, no matter how great, will be of no avail.

In short, in all these areas, we shall, for our part, proceed on the assumption that regardless of what we have done and are doing, we must do more and do it better.

But even the best conceived action programs will not be effective unless two factors are present: (1) There must be top management support, and (2) the programs must have the personal touch. None of us can content ourselves with emphasis on kilowatts of new capacity, more billions of kilowatt-hours generated, and more billions of dollars of plant expansion and financing. Our industry's customers are not statistics, nor answers to questionnaires and opinion surveys. They cannot be considered as a number of average kilowatt-hours of use per year or average dollars of revenue per year. Our customers are people. It is up to us to treat them as individuals and ourselves avoid at all costs in the conduct of our business the inflexibility and bureaucratic procedures which can so easily and thoroughly antagonize and frustrate our customers.

Our customers are affected by an almost infinite variety of personal concerns, and we know their information is frequently not as accurate or complete as we would wish. But this should not lessen our perserverance. It should indeed cause us to redouble our efforts. On this point, however, let us be sure that we strike the word "brainwashing" from the vocabulary. To define sound principle is, of course, important. But more important is to discuss, analyze and achieve an understanding of *why* a sound principle is sound. It is only when we have done this that we have fully equipped ourselves to compete effectively in the intense and critical contest for a favorable public opinion.

We should and we must place the resolution of the future of our industry in the hands of the public we serve. The philosophy which should guide us was expressed most effectively by Thomas Jefferson, when he said:

> "I know of no safe depository of the ultimate powers of society but the people themselves. And if we think them not enlightened enough to exercise their control with wholesome discretion, the remedy is not to take it from them but to inform their discretion by education."

Ralph M. Besse, Executive Vice President, The Cleveland Electric Illuminating Co., presents the EEI Medal to Charles R. Jameson, center, for saving the life of Ralph C. Bunnell, right, apprentice lineman for the company, who contacted an energized wire on Oct. 16, 1958. A physician who attended Mr. Bunnell said: "Without this help given in the manner and with the speed and efficiency it was administered, Mr. Bunnell never would have survived." The presentation was made in Cleveland recently.

BLBS Covers for School Books

NEW protective bookcovers for use by schoolchildren are now being made available by Better Light Better Sight Bureau, 750 Third Ave., New York 17, N. Y., it has been announced by Walter G. McKie, Chairman of the Bureau.

The new covers carry the same copy theme as the very successful 1958 version, but offer new and more striking artwork, a new protective finish and substantially lower prices.

The covers were designed to be suitable for local distribution by electric utilities. More than 100,000 of the previous covers were made available to schools by utilities during 1958.

Bookcovers of this type are highly valued by school boards and school administrators because they help preserve books which must be passed on from year to year, and which are an important item in the school budget. As a matter of fact, Mr. McKie states, bookcovers of some type are required in many areas.

The BLBS bookcovers, which are attractively printed in black and yellow on white stock, are called "Tuff Duck" because of the protective finish which sheds water, rain or slush "like a duck." They are scuff and wear resistant and washable. A copyrighted design eliminates the necessity of cutting or pasting, and makes one size adjustable to fit 85 percent of the textbooks used.

BLBS bookcovers are available to utilities for as little as $30 a thousand on a sliding scale of prices based on quantity. BLBS Bureau suggests that distribution of these bookcovers can supplement utility public service activities and at the same time promote a better understanding of the use of lighting service.

New Dimensions in Electrical Future

(*Continued from page* 125)

part to this end. But the nation's electric power companies, with their intimate community relations, and with their close and frequent contact with the public, are in a unique position to help create a climate of public opinion essential to correction of this massive problem. Inflation cannot be licked unless we dedicate ourselves to this purpose.

While we face great problems, with the rich talent available to us, with the spirit of cooperation we have established, we face even greater opportunities.

Not since the days of George Westinghouse and Thomas Edison have so many new and exciting things been happening so fast in this industry of ours. It is working with new products and processes, new machines and methods, and most important, with new ideas and concepts and principles. In atomic power, we are all working in a whole new art.

Today there is almost no limit to what our technology can achieve, whether we apply that technology to industrial machinery or to household appliances, to electrical apparatus, or to the control system for a guided missile. This is true, above all, when we apply technology to electric power—that product of our industry which a philosopher has called "the most beautiful, the most versatile, the most powerful and the most docile force that man has ever had under his control."

Beyond that, industry needs and wants what we have to sell. The public needs and wants what we have to sell—and the public today has a huge pent-up purchasing power and the highest personal income in its history. And we have the programs to stimulate more widespread use of electrical power. These programs—Live Better Electrically, Power-Up, the Adequate Wiring Program, the Gold Medallion Home, the Total Electric Home, among others—will not only benefit our industry; they will enhance America's standard of living, and increase the dignity of the American worker.

But in the final analysis, the outcome of these efforts, and all of the others we are making together, is dependent on a solution of the overriding domestic economic problem of our time—inflation, and the evils that accompany it.

Alabama Power Wins Edison Award

(*Continued from page* 112)

to the public welfare and the economic growth of the whole State."

The 421,700-kw Coosa River project consists of four new dams and a reconstructed powerhouse and an increase in the size and capacity of an existing dam.

On the Warrior River, Alabama Power is constructing the Lewis Smith Dam. It also has a license to install a power plant at the government dam formerly known as Lock 17 and more recently named Bankhead Lock and Dam. It has a preliminary permit relating to the installation of generating facilities in the navigation dam to be built by the government at Lock 13 on the Black Warrior River.

Alabama Power was selected for the Award through a sequence of nominations by a panel representing every section of the nation, analysis of the nominations of companies by a review committee, and a decision by a committee of judges. Judges were Dr. J. D. Ryder, Dean of Engineering, Michigan State University; C. W. Kellogg, Past President of the Edison Electric Institute; and Mr. Corette.

The Edison Award is being given annually to an electric company "for distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry."

Consisting of a gold medal for the winning company, and $1,000 for the company's employees' benefit fund, the Award has acquired national prominence in the public mind as well as in the electric industry for its significance in recognizing conscientious service and progressive development.

Until the establishment of The Edison Award, outstanding achievement in the industry was recognized through presentation of the Charles A. Coffin Award which was given annually from 1922 through 1957.

Our Challenge in Providing Electric Power for a Strong America

By J. B. Thomas

President and General Manager, Texas Electric Service Co.

OVER the years there has grown into this association a strength and a way of working together effectively that have brought tremendous improvements to the industry. Edison Electric Institute conducts much of its work through some 60 committees with more than 1800 members actively engaged in committee work. The work of the committees is being carried on through the young men who are going to run the electric industry in the future and through the men who are running it now.

Convention Offers Opportunities

In a real sense, this EEI Convention is like a meeting of the industry in committee as a whole. It gives all of us an opportunity to lift our heads from our work in specific areas, regain a broad view of our goals and efforts, reassess the value of what we are doing, and chart new courses.

No one could hope to review, item by item, the good things that have come from this Convention program, the panorama that has been brought before us of the conditions that surround our industry, of its growth—tremendous as it has been—of its markets, of the design of its systems, of the rates to be charged, of the soundness of regulation, and how our affairs can be guided, and many fine and welcome expositions of the details of the industry.

We have had the inspiring address of Senator Goldwater, the citizen with courage and knowledge and skill, who stands in Washington at the head of the line of the defenders of the capitalistic system and free enterprise which are necessary to our existence.

We have had a very interesting and informative address by Mr. Dulles which detailed the challenge of Soviet power. We have been told of the problems of government competition, of atomic energy and its development and tie-in with government competition, and of our legislative difficulties. We have learned of the difficulties along the path of growth and progress. For the solution of many of our difficulties, it seems that we must carry on in the way which we have learned and which has proved successful, but we must not become complacent about it.

I believe it was William Randolph Hearst who said that "organisms that grow complacent are gobbled up by organisms that are not complacent." We cannot afford complacency in any phase of our business.

Our resource for solution of these problems, it seems, is leadership—leadership of the kind provided by the men and women who are here today and who have learned much from this Convention; men with that particular God-given gift of the attributes to lead—to chart the course of people and organizations and to lead them in the proper and sound attack on their problems; leadership which has the ability to recognize the wants of people and the wise way to provide for them; leadership which has the ability—as Jack Busby has said—to convey to people a comprehension of our problems and virtues, and in a language and idiom that can be understood.

We cannot preach in Chinese or Russian to our people. We cannot talk in abstract terms about tentative things. We have to speak and take our message back home in the language of those we serve.

Rhythm of the People

And we have to understand the poise and rhythm at which people live. We cannot force these things. We must live in the rhythm of the people. We wait sometimes an hour, a week, or a year for the idea to ripen. I believe it was Victor Hugo who said there was one thing stronger than all the armies of the world and that was an idea whose time had come. When we bring into the hearts and minds of our people the right ideas at the right time, we move on.

I believe in the value of imagination in times of stress—in the imagination of you young men—and the ability to visualize, think about and outline the new solution, the method of attack, the sound defense, the new device.

An address before the Twenty-Seventh Annual Convention of the Edison Electric Institute, New Orleans, La., April 8, 1959.

We cannot sit still in a business that is born entirely out of the imagination of men; a business that is an art whose progress is dependent on men's imaginations; that has grown into this great industry that we are in today.

It is idle to try to do business in a world or make pictures in men's minds with only words and figures. There must be models and shapes. Things must take form and color. I consider it one of the greatest obligations of building an organization to develop and train the imaginations of young men. Out of their imaginations will come a new understanding of our place in the world and in the nation and the new mechanisms to carry out the business of the industry.

One of the greatest problems challenging the imagination and abilities of all of us lies in government power activities.

It is my personal belief that there already is in existence in the United States a better planned, more workable and broader system for the governmental control of business, and one which, if fully implemented, could put into the hands of a dictatorial government more mechanisms than Lenin, Trotsky and Stalin were able to develop in the first 25 years after the Russian revolution. I am concerned at every move that the public power group makes in pressing for government control of this industry.

Problem of Government Power

The Constitution of Russia reads similar to that of the United States. And the Soviet Constitution provides for practically every guarantee of human liberty and rights of citizenship that is in our own. Then why is it that a tremendous nation of people is practically in slavery to the plans and whims and the caprices of the relatively small Communist party? The answer is Russia has only a one-party government. And a group of men is in power as a mob is with the sword and the gun and the lash to enforce slavery on a people whose Constitution promises them quite the opposite.

And we in the United States are bringing together today a coalition of minorities which, if not stopped, might put us into a situation none of us likes to think about.

We have talked about TVA, the largest electricity supply institution in the world. And we know about hydroelectric power in the West and Northwest. Our courageous and capable friends there have held their ground very well under the conditions. We know about the super organization of the rural electrification groups and the cooperatives, and we know about the big meeting held in Washington to propagandize, to strengthen, to inspire a lot of fine people to try to build a duplicating grid of transmission lines and to try to infiltrate every city and town in the country to increase the government's part of our business.

I thi... it is very important that we continue to put before the people of the United States the story of the marvelous job that has been done in supplying their electricity and how all parts of the nation have been covered.

For several years I have had the feeling that we might be taking a more active part in the research being done in the electric industry. When we go to recruit the most brilliant men we can find from schools and colleges, we discover they are going into other industries and other fields. There is more romance in space, electronics, semi-conductors and complex chemistry. They judge that we are not providing in our business the romance and challenge that these top men want.

Sometimes they think, and not without cause, that since we have left to the manufacturer the development of apparatus and the research that goes into it, we are just simple converters and distributors of bulk energy. They think that perhaps there is no more romance about our business than there is about a department store or lumber yard.

I believe a sound policy for correcting this misunderstanding should be started during the coming year. I think there should be organized in this great association plans for centralization of the policies of research and information so that we, the middle-men who have to find the money for new facilities, will be able to have a hand in research and development. We should be able to offer these young men which we want in our business a part in research on both sides of the street. We should be able to offer them a challenge to their imagination and their ingenuity, and arouse in them a desire to become a part of a business which spreads across the spectrum of apparatus, conversion, distribution and utilization. We want this so these young men will be coming to us with ideas about new devices to provide more comfort for the customer in his home or about the development of new equipment to provide power. We want to be again, as we were in the beginning, a complete and whole industry from the viewpoint of research.

Mr. Busby's paper has brought to mind the great gap in consumer understanding that we have. The paper about the problems in Washington, and all of us have them there, touches upon a very great problem and a wide area of influence. Men on the highest political scene in Washington want to further government enterprise. All of them sincerely believe in government ownership. Some are pandering to a particular group of voters for re-election; some are just going along with the tide—whatever tide seems to be running on which they can put their vote.

No Reason for Discouragement

I see no reason why we should be discouraged, why we should not fight with every tool available this encroachment of socialization. We have been given charge of this marvelous transformation of static energy—into something that is alive, going out over wires into homes, stores and factories. All of us have had a part in it.

We should be proud and perfectly willing to make the sacrifice and the effort to defend it at home, in Washington, in commerce and politically wherever it is attacked. We should defend it for ourselves, for our investors, but most of all, for those for whom we labor and work—our children and their children. Their future must not be mortgaged because we are the front-line trench. We are the sector that must defend private enterprise and capitalism if we are to survive.

People in Power

W. E. MONTGOMERY, General Manager of Operations, Southern California Edison Co., has been elected Vice President of the company. Mr. Montgomery, with the utility since 1926, was named to his most recent post in 1957 after a series of promotions. He served in the U. S. Navy during World War II.

CHARLES KIEL, Manager, Operating Services Dept., Long Island Lighting Co., has been elected Vice President, Operating Services. A 1926 graduate of Pennsylvania State College with a degree in electrical engineering, Mr. Kiel joined Long Island Lighting's construction department in 1933.

WILLIAM D. BURGESS, assistant to the president, El Paso Electric Co., was elected a Vice President of the company. He joined El Paso Electric in 1926, remaining with it until 1947 when he became vice president and general manager of Missouri Service Co. Subsequently, he joined Stone & Webster Service Corp. He rejoined the Texas utility in 1957.

JOHN T. KIMBALL, Vice President and General Manager, Idaho Power Co., was recently named Executive Vice President, American & Foreign Power Co. Mr. Kimball joined the Idaho utility in 1954, coming from the Arizona Public Service Co., where he had served as executive vice president. He began his utility career in 1934 with Mississippi Power & Light Co. Mr. Kimball has just completed a term as president of the Northwest Electric Light & Power Association.

ROBERT M. HETHERINGTON, Assistant to the President, Iowa-Illinois Gas and Electric Co., has been elected Vice President in Charge of Operations. Mr. Hetherington joined the company in 1946 as an industrial sales engineer, after three years' service with the U. S. Air Force. He was named assistant manager of the gas department in 1950, manager of the gas department in 1954 and assistant to the president in 1957.

Progress at the Enrico Fermi Atomic Power Plant

(*Continued on page* 158)

trical equipment. To maintain a clean erection process, a "clean-building" has been built over the reactor. All pieces of equipment which are not beyond the capacity of the hoist within the building, or the interior dimensions of the building, are brought through the clean-building and then placed in the reactor.

Clean-Building Appearance

The interior of the clean-building has the appearance of a small fabrication shop. However, great precautions are taken to prevent the accumulation of dirt, oils, waste and metal filings and chips. The workmen are required to wear clean white clothing and fabric boots over their regular work shoes. All parts and equipment which will be placed in the reactor are carefully cleaned at this point in the erection process. The rotating shield plug, which enables the handling mechanism to withdraw any individual core or blanket element, was shipped to Detroit where internal plug shielding is now being installed. The plug, weighing about 130 tons, has been shipped to the Fermi site. To continuously purify the sodium used as a coolant in the reactor, the oxides and hydrides which are picked up by the sodium must be removed. Piping within the sodium clean-up room is fabricated from stainless steel. The interior is sheathed in steel to provide an atmospheric seal to prevent leakage either in or out, and to prevent any reaction of sodium with concrete should there be a sodium spill.

Ever since field construction began, continued requests have been made by individuals and groups to visit the plant site. In order to comply with these requests, an Atomic Information Center was built in 1958 on the edge of the plant site where guests are received.

The center contains a comprehensive atomic energy exhibit and a small area where movies can be shown and lectures delivered. Almost 25,000 people have visited this building since last August when it was opened.

It is expected that the plant will be ready for non-nuclear tests in June. Nuclear tests should begin with criticality in September, 1960, at which time the Detroit Edison turbine-generator will be ready to receive steam. After a full year of testing, the plant will be ready for commercial operation in September, 1961.

To Cost $42 Million

The nuclear plant total cost, excluding research and development, is about $42 million. Research and development will add another $19 million, and the Detroit Edison turbine plant will cost $17 million. Adding these together, the total cost is about $78 million. In addition to this, the Atomic Energy Commission has agreed to undertake $4.4 million worth of reactor research work generally applicable in the field of breeder reactors. These represent the most recent cost data which were submitted to the Joint Committee on Atomic Energy in March.

CONVENTIONS AND MEETINGS

1959

APRIL

30-
May 1 EEI Statistical Committee, Dearborn Inn, Detroit, Mich.

30-
May 1 PEA Structures & Hydraulics Committee, Pick-Roosevelt Hotel, Pittsburgh, Pa.

30-
May 1 PEA Transmission & Distribution Committee, Pocono Manor Inn, Pocono Manor, Pa.

30-
May 1 PIP Youth Conference on the Atom, The Claridge Hotel, Atlantic City, N. J.

MAY

4- 5 PEA System Planning Committee, Mountain View Hotel, Greensburg, Pa.

4- 6 EEI Prime Movers Committee, Palmer House, Chicago, Ill.

4- 6 EEI Purchasing and Stores Annual Meeting, Hotel Soreno, St. Petersburg, Fla.

6- 8 PUAA Annual Convention, Sheraton Hotel, Dallas, Tex.

7- 8 EEI Industrial Relations Committee joint with Personnel Committee of the Ohio Electric Institute, Netherlands Hilton Hotel, Cincinnati, Ohio

7- 8 EEI Residential Lighting Promotion Committee, EEI Headquarters, New York City, N. Y.

7- 8 EEI Transmission & Distribution Committee, Shoreham Hotel, Washington, D. C.

7- 8 PEA Electrical Equipment Committee, Bedford Springs, Pa.

11-13 EEI Hydraulic Power Committee, Arrowhead Lodge, Lake Ozark, Mo.

12 EEI Commercial Electric Cooking Conference, Sheraton Hotel, Chicago, Ill.

12-13 Indiana Electric Association Young Men's Utility Conference, Purdue University, Lafayette, Ind.

13-15 New Jersey Utilities Association Spring Meeting, Seaview Country Club, Absecon, N. J.

14 PIP East North Central Region, Public Service Co. of Indiana, Plainfield, Ind.

14-15 PEA Relay Committee Meeting, Irem Temple Country Club, Dallas, Pa.

18-19 NELPA Business Development Section, Advertising & Public Relations Committee, & Rate Research Committee, Multnomah Hotel, Portland, Ore.

19 Pacific Coast Electrical Association Board of Directors Meeting, San Francisco, Calif.

20-22 Pacific Coast Electrical Association Annual Convention, Fairmont Hotel, San Francisco, Calif.

25-26 EEI Electrical System & Equipment Committee, Roosevelt Hotel, Pittsburgh, Pa.

25-28 ASME Design Engineering Conference & Design Engineering Show, Convention Hall, Philadelphia, Pa.

JUNE

4- 6 NELPA Accounting & Business Practice Section, Finlen Hotel, Butte, Mont.

7- 9 Wisconsin Utilities Association Accounting Section Convention, Lake Lawn Lodge, Delavan, Wis.

10 PIP Steering Committee, Pierre Hotel, New York, N. Y.

22-23 Michigan Electric Association Annual Meeting, Mackinac Island, Michigan.

22-26 Air Pollution Control Association Annual Meeting, Hotel Statler, Los Angeles, Calif.

24-26 Canadian Electrical Association Annual Convention, Manoir Richelieu, Murray Bay, Que.

25-26 EEI-AGA Depreciation Accounting Committees, Chatham Bars Inn, Chatham, Mass.

JULY

6-8 EEI Accident Prevention Committee, Biltmore Hotel, Los Angeles, Calif.

SEPTEMBER

7-10 Illuminating Engineering Society National Technical Conference, Fairmont & Mark Hopkins Hotels, San Francisco, Calif.

11-12 The Maryland Utilities Association Annual Fall Conference, The Cavalier, Virginia Beach, Va.

14-15 EEI-AGA 1959-1960 Accounting Division & Section Organization Meetings, Hotel Cleveland, Cleveland, Ohio

16-17 PIP Workshop Conference, Warwick Hotel, Philadelphia, Pa.

17-18 EEI Industrial Power & Heating Group, Treadway Inn, Niagara Falls, N. Y.

17-19 Public Utilities Association of the Virginias 41st Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

21-23 EEI Industrial Relations Committee Twelfth Annual Round Table Conference, Drake Hotel, Chicago, Ill.

24-25 Missouri Valley Electric Association Accounting Conference, President Hotel, Kansas City, Mo.

28-30 NELPA 52nd Annual Meeting, Hotel Vancouver, Vancouver, B. C.

30-
Oct. 1 PEA Annual Meeting, Philadelphia, Pa.

OCTOBER

7- 9 Missouri Valley Electric Association Sales, Rural & Home Service Conference, President Hotel, Kansas City, Mo.

7- 9 Indiana Electric Association Annual Convention, French Lick-Sheraton Hotel, French Lick, Ind.

12-15 NARUC Convention, Bellevue-Stratford Hotel, Philadelphia, Pa.

14-16 Wisconsin Utilities Association Operating & Sales Convention, Schroeder Hotel, Milwaukee, Wis.

15-16 Southeastern Electric Exchange Engineering & Operation Section, Fall Meeting, Biltmore Hotel, Atlanta, Ga.

20-22 EEI Area Development Committee, Westward Ho Hotel, Phoenix, Ariz.

22-23 EEI Statistical Committee, The Homestead, Hot Springs, Va.

22-23 Southeastern Electric Exchange Accounting Conference, Shoreham Hotel, Washington, D. C.

25-29 Rocky Mountain Electrical League 56th Annual Fall Convention, Broadmoor Hotel, Colorado Springs, Colo.

NOVEMBER

4- 6 New Jersey Utilities Association Annual Meeting, Seaview Country Club, Absecon, N. J.

5- 6 Pacific Coast Electrical Association, Hawaiian Conference, Matson House, Honolulu, Hawaii.

12-13 Electric Council of New England Third Annual Conference, Hotel Somerset, Boston, Mass.

16-18 Southeastern Electrical Exchange Sales Section, Roosevelt Hotel, New Orleans, La.

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Home Service, JUDITH O'FLAHERTY.....Philadelphia Electric Co., Philadelphia, Pa.
Residential Appliance Promotion, E. J. HURLEY.....The Detroit Edison Co., Detroit, Mich.
Residential Lighting Promotion, R. J. MILLER.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Residential Wiring Promotion, J. R. FURBER.....Northern States Power Co., Minneapolis, Minn.
Advertising, J. V. MACDONALD.....Boston Edison Co., Boston, Mass.
Area Development, S. F. MCGOWAN.....Northern States Power Co., Minneapolis, Minn.
Electrical Living Policy Committee, G. W. OUSLER.....Duquesne Light Co., Pittsburgh, Pa.
Sales Personnel & Training, G. W. WARNER.....Consumers Power Co., Jackson, Mich.

Customer, Employee and Investor Relations Executive, C. E. OAKES.....Pennsylvania Power & Light Co., Allentown, Pa.
Customer Relations, KIMBALL JACK.....The Washington Water Power Co., Spokane, Wash.
Industrial Relations, E. J. BRILL.....Pennsylvania Power & Light Co., Allentown, Pa.
Investor Relations, L. E. REYNOLDS.....The Connecticut Light & Power Co., Hartford, Conn.

Engineering & Operating Division Executive, W. L. CHADWICK.....Southern California Edison Co., Los Angeles, Calif.
Electrical System & Equipment, D. W. TAYLOR.....Public Service Electric and Gas Co., Newark, N. J.
Hydraulic Power, E. S. HARRISON.....Georgia Power Co., Atlanta, Ga.
Meter & Service, FLOYD SALMON.....Central Power and Light Co., Corpus Christi, Texas
Prime Movers, V. L. STONE.....Commonwealth Edison Co., Chicago, Ill.
Transmission & Distribution, W. M. PENNEY.....Union Electric Co., St. Louis, Mo.
Transportation, W. B. STREITLE.....Rochester Gas and Electric Corp., Rochester, N. Y.

General Division Executive, P. A. FLEGER.....Duquesne Light Co., Pittsburgh, Pa.
Accident Prevention, I. R. DOHR.....Consumers Power Co., Jackson, Mich.
Awards, M. C. ALBRITTAIN.....Baltimore Gas and Electric Co., Baltimore, Md.
Electric Power Survey, ARTHUR S. GRISWOLD.....The Detroit Edison Co., Detroit, Mich.
Insurance, D. E. WILLIAMS.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Legal, H. L. BRANAN.....Oklahoma Gas and Electric Co., Oklahoma City, Okla.
Purchasing and Stores, G. H. COLE.....Alabama Power Co., Birmingham, Ala.
Rate Research, K. W. HASBROUCK.....New York State Electric & Gas Corp., Ithaca, N. Y.
Research Projects, E. L. HOUGH.....Union Electric Co., St. Louis, Mo.
Statistical, A. E. BUSH.....The Detroit Edison Co., Detroit, Mich.
Technical Exchange for Overseas Visitors, HARVEY BUMGARDNER.....The Detroit Edison Co., Detroit, Mich.

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